



FINAL ENVIRONMENTAL IMPACT STATEMENT

**SUNROC CORPORATION
CHICKEN CREEK GYPSUM MINE
SAN PITCH MOUNTAINS
JUAB COUNTY, UTAH**

**USDA FOREST SERVICE
INTERMOUNTAIN REGION
MANTI-LA SAL NATIONAL FOREST
SANPETE RANGER DISTRICT**



Responsible Official:

Allen Rowley
Acting Forest Supervisor
Manti-La Sal National Forest
599 West Price River Drive
Price, Utah 84501

For Further Information Contact:

Karl Boyer
Geologist
Manti-La Sal National Forest
599 West Price River Drive
Price, Utah 84501
(435) 637-2817



ABSTRACT

Sunroc Corporation is proposing a supplement to its existing approved Plan of Operations under 36 CFR 228.4(d) to include additional NFS lands for surface mining that are not included in the currently approved plans and combine the existing plans into a Large Mine (defined by Utah Department of Oil, Gas, and Mining as greater than five acres) Plan of Operations (Plan). The Plan proposes to commence mining operations on NFS lands at the East Mine and Upper West Mine and continue mining operations on NFS lands at the Lower West Mine of the Chicken Creek Gypsum Mine. In addition, it proposes an additional mine access road to the Upper Chicken Creek West Mine.

The mine is located approximately two miles east of Levan, Utah, on the west slope of the San Pitch Mountains within the Sanpete Ranger District of the Uinta National Forest (administered by the Manti-La Sal National Forest). The mining operations are divided into two parts, an East Mine and a West Mine. The East Mine claims are located in parts of Sec. 34, T14S, R1E and the West Mine claims are in parts of Sec. 4, T15S, R1E.

Alternatives considered are:

- Alternative One – No Action Alternative.
Under the No Action Alternative Sunroc would not expand its mining operations on NFS lands and would only continue its operations in the previously approved mining areas.
- Alternative Two – The Proposed Action. Approve the Plan as Submitted.
Under this alternative, mining activities would be approved at the Chicken Creek East and West sites as proposed in Sunroc's Plan.
- Alternative Three – Approve the Plan with Additional Mitigation Measures.
Approve the Plan with additional conditions needed to protect other non-mineral National Forest surface resources.

Send Comments to: US Forest Service
c/o Karl Boyer
599 West Price River Drive
Price, Utah 84501

Tel#: 435-636-3551
e-mail: kboyer@fs.fed.us





The United States Department of Agriculture (USDA) prohibits discrimination in its programs on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact the USDA Office of Communications at (202) 720-2791.

To file a complaint, write the Secretary of Agriculture, U.S. Department of Agriculture, Washington, D.C. 20250 or call 1-800-245-6340 (voice) or (202) 720-1127 (TDD). USDA is an equal opportunity employer.

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations.": Based on comments received during scoping, no adverse environmental or human health effects on minority or low income populations have been identified that could result from the proposed action and subsequent decisions. Environmental justice means that, to the greatest extent practicable and permitted by law, all populations are provided the opportunity to comment before decisions are rendered on, are allowed to share in the benefits of, and not excluded from, and are not affected in a disproportionately high and adverse manner by, government programs and activities affecting human health or the environment. Decisions must be consistent with this Order. The decisions of the responsible officials will seek and incorporated public involvement. The decisions must not have a discernible effect on minorities, American Indians, or women, or the civil rights of any United States citizen. Nor must they have a disproportionate adverse impact on minorities or low-income individuals.



TABLE OF CONTENTS

S-1.0 SUMMARY	S-1
S-1.1 INTRODUCTION	S-1
S-1.2 PROPOSED ACTION	S-1
S-1.3 PURPOSE AND NEED	S-1
S-1.4 PUBLIC INVOLVEMENT	S-2
S-1.5 ISSUES	S-2
S-1.6 ALTERNATIVES ANALYZED	S-3
S-1.6.1 Description of Proposed Alternatives	S-3
S-1.7 DECISIONS TO BE MADE	S-4
 CHAPTER 1 – PURPOSE AND NEED FOR ACTION	 1-1
1.0 INTRODUCTION	1-1
1.1 PURPOSE AND NEED FOR ACTION	1-3
1.2 MANAGEMENT GUIDANCE AND DIRECTION	1-5
1.2.1 Land and Resource Management Plan	1-5
1.2.2 Interim Directive on Inventoried Roadless Areas on National Forests	1-5
1.2.3 The Practical Guide to Reclamation in Utah	1-6
1.3 PROPOSED ACTION	1-8
1.3.1 Modification to Proposed Action Between DEIS and FEIS	1-9
1.4 DECISIONS TO BE MADE	1-9
1.5 PUBLIC INVOLVEMENT	1-10
1.6 ISSUES	1-10
1.6.1 Key Issues	1-11
A. Impacts to Inventoried Roadless Areas (IRA) and Unroaded/Undeveloped Areas	1-11
B. Wildlife Habitat Segmentation and Avoidance of Winter Range	1-11
C. Impacts to T, E & S Species and Management Indicator Species	1-11
D. Visual Resources	1-12
E. Socioeconomic	1-12
F. Water Resources	1-12
1.6.2 Issues Considered but Not Further Evaluated	1-13
A. Air Quality	1-13
B. Soil and Vegetation	1-13
C. Cultural and Paleontological Resources	1-13
D. Noxious Weeds	1-14
E. Range	1-14
F. Timber	1-14
G. Recreation and Transportation	1-14
1.7 PERMITS AND AUTHORIZATIONS	1-15
1.8 AVAILABILITY OF PROJECT RECORDS	1-17
1.9 BEST AVAILABLE SCIENCE	1-17
 CHAPTER 2 – ALTERNATIVES	 2-1
2.0 INTRODUCTION	2-1
2.1 DEVELOPMENT OF THE ALTERNATIVES	2-1
2.2 DESCRIPTION OF ALTERNATIVES	2-2
2.2.1 Alternatives Considered in Detail	2-2



2.2.1.1 Alternative One – No Action Alternative.....	2-2
2.2.1.2 Alternative Two – Proposed Action.....	2-3
2.2.1.2.1 Modification to Proposed Action	2-5
2.2.1.3 Alternative Three – Preferred Alternative.....	2-5
2.2.2 Alternatives Considered but Eliminated from Further Study.....	2-6
2.2.3 Comparison Summary of Alternatives.....	2-7

CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES.....3-1

3.0	INTRODUCTION	3-1
3.1	UNROADED AND UNDEVELOPED AREAS & INVENTORIED ROADLESS AREAS.....	3-2
3.1.1	Introduction.....	3-2
3.1.2	Affected Environment.....	3-3
3.1.3	Impacts.....	3-8
3.1.3.1	Alternative One – No Action Alternative.....	3-8
3.1.3.2	Alternative Two – Proposed Action.....	3-8
3.1.3.3	Alternative Three – Mitigation Measures	3-15
3.2	WILDLIFE	3-15
3.2.1	Introduction.....	3-15
3.2.2	Affected Environment.....	3-15
3.2.2.1	Habitat.....	3-15
3.2.2.2	Wildlife Species	3-19
3.2.3	Impacts.....	3-23
3.2.3.1	General Impact.....	3-23
3.2.3.2	Impacts of the Alternative.....	3-25
3.2.4	Mitigation Measures Not Included in The Plan of Operations.....	3-25
3.3	TERRESTRIAL AND AQUATIC THREATENED, ENDANGERED, SENSITIVE AND MANAGEMENT INDICATOR SPECIES.....	3-26
3.3.1	Introduction	3-26
3.3.2	Affected Environment.....	3-27
3.3.2.1	Description of Threatened and Endangered Species	3-27
3.3.2.2	Description of Sensitive Species and Management Indic. Species.....	3-29
3.3.3	Impacts.....	3-38
3.3.3.1	Ute Ladies’-Tresses.....	3-39
3.3.3.2	Bald Eagle.....	3-39
3.3.3.3	Peregrine Falcon.....	3-39
3.3.3.4	Spotted Bat.....	3-40
3.3.3.5	Townsend’s Big Eared Bat.....	3-41
3.3.3.6	Columbia River Spotted Frog.....	3-41
3.3.3.7	Rocky Mountain Elk.....	3-42
3.3.3.8	Mule Deer.....	3-43
3.3.3.9	Golden Eagle.....	3-44
3.3.3.10	Macroinvertebrates.....	3-45
3.3.4	Mitigation Measures Not Included in The Plan of operations that Would be Applied to Alternative Three	3-45
3.4	MIGRATORY BIRDS	3-45
3.4.1	Introduction	3-45
3.4.2	Affected Environment.....	3-45
3.4.3	Impacts.....	3-53
3.4.3.1	Black-throated Gray Warbler.....	3-54
3.4.3.2	Black-tailed Hummingbird	3-55



TABLE OF CONTENTS

	3.4.3.3 Ferruginous Hawk.....	3-55
	3.4.3.4 Gray Vireo.....	3-56
	3.4.3.5 Juniper Titmouse.....	3-56
	3.4.3.6 Lewis' Woodpecker.....	3-57
	3.4.3.7 Virginia's Warbler.....	3-57
	3.4.3.8 Pinyon Jay	3-58
	3.4.4 Mitigation Measures Not Included in The Plan of Operations.....	3-58
3.5	VISUAL RESOURCES.....	3-58
	3.5.1 Introduction.....	3-58
	3.5.2 Visual Quality Objectives (VQO's)	3-59
	3.5.3 Landscape Character Description.....	3-61
	3.5.4 Impacts to Visual Resources	3-62
	3.5.4.1 Alternative One – No Action Alternative.....	3-63
	3.5.4.2 Alternative Two – Proposed Action.....	3-64
	3.5.4.3 Alternative Three – Preferred Alternative.....	3-66
3.6	SOCIOECONOMICS	3-68
	3.6.1 Social Conditions	3-68
	3.6.1.2 Introduction.....	3-68
	3.6.1.3 Affected Environment.....	3-68
	3.6.1.4 Impacts.....	3-69
	3.6.1.4.1 Alternative One	3-69
	3.6.1.4.2 Alternatives Two and Three	3-70
	3.6.1.5 Mitigation Measures Not Included in The Plan of Operations	3-70
	3.6.2 Economic Conditions.....	3-70
	3.6.2.1 Introduction.....	3-70
	3.6.2.2 Affected Environment.....	3-70
	3.6.2.3 Impacts.....	3-72
	3.6.2.3.1 Alternative One – No Action Alternative.....	3-72
	3.6.2.3.2 Alternative Two – Proposed Action.....	3-72
	3.6.2.3.3 Alternative Three –Preferred Alternative	3-73
	3.6.2.4 Mitigation Measures Not Included in The Plan of Operations	3-73
	3.6.3 Environmental Justice	3-73
3.7	WATER RESOURCES	3-74
	3.7.1 Introduction.....	3-74
	3.7.2 Analysis Methodology	3-74
	3.7.3 Impacts.....	3-77
	3.7.3.1 Alternative One – No Action Alternative.....	3-77
	3.7.3.2 Alternative Two – Proposed Action.....	3-78
	3.7.3.3 Alternative Three – Preferred Alternative.....	3-78
	3.7.4 Mitigation Measures Not Included in The Plan of Operations.....	3-79
3.8	CUMULATIVE IMPACTS.....	3-79
	3.8.1 Introduction.....	3-79
	3.8.2 Past, Present, and Reasonably Foreseeable Future Actions	3-80
	3.8.2.1 Past Projects/Actions.....	3-80
	3.8.2.2 Present Projects/Actions	3-80
	3.8.2.3 Reasonably Foreseeable Future Projects/Actions	3-81
	3.8.3 Inventoried Roadless Areas and Unroaded and Undeveloped Areas	3-81
	3.8.4 Wildlife.....	3-81
	3.8.5 Terrestrial and Aquatic Threatened, Endangered, Sensitive, Management Indicator Species, and Migratory Birds.....	3-82
	3.8.6 Visual Resources.....	3-82
	3.8.7 Socioeconomics	3-83
	3.8.8 Water Resources	3-84



CHAPTER 4 – CONSULTATION AND COORDINATION	4-1
4.0 INTRODUCTION	4-1
4.1 DOCUMENT CONSULTATION AND COORDINATION	4-1
4.1.1 Federal, State, and Local Agencies	4-1
4.1.2 Tribes.....	4-1
4.1.3 Others.....	4-1
4.2 DISTRIBUTION OF THE EIS	4-1
 CHAPTER 5 – PREPARERS AND CONTRIBUTORS.....	5-1
 CHAPTER 6 – REFERENCES... ..	6-1
 CHAPTER 7 – COMMENTS AND RESPONSES.....	7-1
7.0 INTRODUCTION.....	7-1
7.1 Responses to Comments Received During Project Scoping.....	7-1
7.1.1 National Park Service	7-1
7.1.2 U.S. Environmental Protection Agency	7-1
7.1.3 Utah Environmental Congress	7-4
7.2 Responses to Comments Received on the DEIS.....	7-6
7.2.1 Department of the Interior, U.S. Geological Survey	7-6
7.2.2 U.S. Environmental Protection Agency	7-7
Water Resources	7-7
Air Quality	7-10
Environmental Justice	7-11
7.3 Comment Letters.....	7-12
7.3.1 Comment Letters Received During Initial Project Scoping	7-12
7.3.1.1 National Park Service.....	7-12
7.3.1.2 U.S. Environmental Protection Agency	7-13
7.3.1.3 Utah Environmental Congress	7-15
7.3.2 Comment Letters Received on the DEIS	7-17
7.3.2.1 Department of the Interior, U.S. Geological Survey	7-17
7.3.2.2 U.S. Environmental Protection Agency	7-19
 APPENDICES	
 APPENDIX A. PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS	A-1
 APPENDIX B. SOIL and WATER CONSERVATION PRACTICES & BEST MANAGEMENT PRACTICES.....	B-1
 APPENDIX C. AIR QUALITY.....	C-1
 APPENDIX D. GOLDEN EAGLE MONITORING PLAN.....	D-1



LIST OF TABLES

CHAPTER 1

Table 1.1	East Mine Placer Claims	1-4
Table 1.2	West Mine Placer Claims	1-4
Table 1.3	Disturbances to Forest Land	1-8
Table 1.4	Disturbances to Private Land	1-8
Table 1.5	Permits, Approvals, and Consultation That May Be Required For Implementation.....	1-15

CHAPTER 2

Table 2.1	Comparison of Alternatives	2-7
-----------	----------------------------------	-----

CHAPTER 3

Table 3.1	Wilderness Attributes and Roadless Characteristics	3-6
Table 3.2	Impacts to Wilderness Attributes and Roadless Characteristics Under Alternative Two	3-9
Table 3.3	Land Cover Types by Land Ownership Within the Project Area	3-16
Table 3.4	Mammals That May be Present in the Project Area and Their Habitat	3-19
Table 3.5	Fish Species that May Occur in the Study Area	3-23
Table 3.6	ESA Listed Species Potentially Occurring in Juab Valley, Utah, Their Potential Occurrence in the Project Area, and Consideration in this EIS	3-27
Table 3.7	Sensitive Plant, Wildlife, and Fish Species that Could Occur on the San Pitch Division of the Manti-La Sal National Forest	3-29
Table 3.8	Management Indicator Species that Potentially Occur Within the Project Area on the San Pitch Division of the Manti-La Sal National Forest	3-32
Table 3.9	Priority Migratory Birds of Interest	3-46
Table 3.10	VQO's for the Project Area	3-60
Table 3.11	Visual Resource Impacts	3-68
Table 3.12	Employed Civilian Population 16 Years and Older (2000)	3-71
Table 3.13	Other Active Mines/Quarries Within ~12 Miles of the Chicken Creek Mine Site	3-80

LIST OF FIGURES

CHAPTER 1

Figure 1.1	Sunroc Gypsum Mine Location Map	1-2
Figure 1.2	Sunroc Gypsum Mine Area Overview	1-7

CHAPTER 3

Figure 3.1	Inventoried Roadless Areas and Draft Undeveloped/Unroaded Areas	3-5
Figure 3.2	Land Cover Types	3-18
Figure 3.3	Winter Range (Rocky Mountain Elk and Mule Deer).....	3-22



S-1.0 SUMMARY

S-1.1 INTRODUCTION

This Environmental Impact Statement (EIS) was initiated by the Forest Service in response to Sunroc Corporation (Sunroc) submitting a Plan of Operations (the Plan) to conduct open-pit gypsum mining in the San Pitch Mountains of the Uinta National Forest, administered by the Sanpete Ranger District of the Manti-La Sal National Forest.

This EIS considers the environmental, social, and economic effects of the United States Department of Agriculture, Manti-La Sal National Forest approving the Plan for the expansion onto mining claims held within National Forest System (NFS) Lands by Sunroc's Chicken Creek Gypsum Mine as proposed in Sunroc's Plan. Sunroc's proposed Plan is a revision of the plan that they are currently operating under. The analysis is tiered to the Land and Resource Management Plan Final Environmental Impact Statement, Manti-La Sal National Forest, 1986 (Record of Decision November 5, 1986), and subsequent environmental analyses and decisions for amendments to the Forest Plan. The FEIS concentrates on issues specific to the proposed action that were raised during the comment period for the DEIS.

The EIS specifically addresses the consequences of implementing three alternatives, including the No Action Alternative (taking no further action to evaluate Sunroc's proposal), the Proposed Action (to approve the Plan as submitted by Sunroc), and approving the Plan with additional mitigation measures to protect Forest resources. The analysis considers the cumulative effects of each alternative as well as past, present, and reasonably foreseeable future actions.

S-1.2 PROPOSED ACTION

The operator is currently proposing a supplement to its existing approved Plan of Operations (Plan) under 36 CFR 228.4(d) to include additional NFS lands for surface mining that are not included in the currently approved plans and combine the existing plans into a Large Mine (defined by DOGM as greater than five acres) Plan of Operations. The Plan proposes to commence mining operations on mining claims on NFS lands at the East Mine and Upper West Mine and continue mining operations on mining claims on NFS lands at the Lower West Mine of the Chicken Creek Gypsum Mine. In addition, it proposes an additional mine access road to the Upper Chicken Creek West Mine.

S-1.3 PURPOSE AND NEED

The Forest Service is required to review and analyze a proposed plan of operations to conduct mining operations prior to approving it, pursuant to the Mining Laws. Sunroc has a right to develop its claims as set forth by the General Mining Law of 1872 as amended. These laws provide the public with a statutory right to conduct prospecting, exploration, and development



activities (1872 Mining Law and 1897 Organic Act), provided they are reasonably incident (1955 Multiple Use Mining Act and case law) to mining and comply with other federal laws.

This action is needed so that Sunroc may expand their operations on NFS lands in order to continue operation of the Chicken Creek Mine. By completing the NEPA process Sunroc and the Forest Service will comply with the federal requirements to complete the NEPA process on actions which will take place on federal lands. Sunroc has a responsibility to conduct safe and environmentally sound practices within the operating areas and the Forest Service has the responsibility to manage surface resources on NFS lands. Forest Service mining regulations state that “operations shall be conducted so as, where feasible, to minimize adverse environmental effects on National Forest System surface resources” (36 CFR 228.8). The Forest Service may impose reasonable conditions on operations which do not endanger or materially interfere with prospecting, mining, or processing operations or reasonably incident uses (1955 Multiple Use Mining Act and case law).

S-1.4 PUBLIC INVOLVEMENT

Legal Notices of Proposed Action for the environmental analysis of The Plan (Sunroc, 2009) were published on May 14, 2008 in the *Nephi Times News* and the *Sanpete Messenger*. On May 13, 2008 the Legal Notice was published in the *Sun Advocate*. In addition 19 scoping letters were mailed to interested parties. Based on comments, both external and internal, it was determined an EIS was needed to analyze the proposed action. The Notice of Intent (NOI) to prepare an EIS was published in the *Federal Register* on August 1, 2008. The Forest Service received three responses to this notice. The responses were received from Utah Environmental Congress (UEC), the National Park Service (NPS), and the Environmental Protection Agency (EPA). The NPS letter stated that they had no comment. The EPA listed issues that they want addressed in the EIS; these issues included revegetation, erosion control, stream monitoring for dissolved and suspended solids and macro-invertebrate communities, dust suppression, and cumulative impacts. The letter from UEC expressed concern with mining in the existing Inventoried Roadless Area (IRA), viewshed impacts, impacts to golden eagles and their habitats, and impacts to big game habitat. The proposed action has been published in the Forest Service Schedule of Proposed Actions (SOPA) database. A range of alternatives has been formally adopted to address the purpose and need and respond to issues in the EIS.

The Notice of Availability (NOA) for the DEIS was published in the Federal Register on December 30, 2011. The 45 day comment period ended February 13, 2012. Two comment letters were received; one from the Environmental Protection Agency (EPA), Region 8 Headquarters in Denver, CO and one from the Department of the Interior, US Geological Survey (USGS), Denver, CO. The EPA provided comments on water resources, air quality, and environmental justice. The USGS commented on the migratory bird analysis and citations.



S-1.5 ISSUES

Issues were identified through the project scoping process and Interdisciplinary Team (IDT) meetings. The issues have been used to develop alternatives and help direct data collection and the analysis process. This process identified significant issues pertinent to the development of alternatives, and mandatory issues set by law and policy. It also identified those issues outside the scope of this decision as Issues Considered but not Further Evaluated. The evaluation criteria for each of the key issues were used to quantify impacts and compare alternatives.

Of the issues raised, only six were carried forward for further analysis. These issues include: 1) unroaded and undeveloped areas; 2) wildlife habitats; 3) Threatened, Endangered, Sensitive and Management Indicator species; 4) visual resources; 5) socioeconomics; and 6) water resources.

S-1.6 ALTERNATIVES ANALYZED

All alternatives must be consistent with the rights of the public to conduct prospecting, exploration, and development activities on valid mining claims on federal lands provided these activities are reasonably incident to mining and comply with federal laws and regulations. The alternative formulation criteria are; (1) the alternative meets the rights and requirements of the mining claimant; (2) the alternative meets Forest Plan objectives and direction; (3) the alternative minimizes effects to other resources; and (4) the alternative meets the purpose and need. In addition to the No Action Alternative two action alternatives were analyzed: the Proposed Action (Approve the Plan as Submitted) and the Preferred Alternative (Approve the Plan with Additional Conditions Needed to Protect Other Non-mineral Surface Resources).

S-1.6.1 Description of Proposed Alternatives

Alternative One (No Action Alternative)

Under Alternative One, currently approved operation plans would continue to guide the mining operation. Sunroc would continue to operate the mine, but no expansion to additional mining claims on the Forest would occur. Future mining operations could only continue on private lands.

Alternative Two (Proposed Action) – Approve the Plan of Operations as Submitted.

Under this alternative, mining operations would be approved as proposed in Sunroc's Plan. No additional mitigations would be required to protect Forest resources.

Alternative 3 (Preferred Alternative) – Approve the Plan of Operations with Additional Conditions Needed to Protect Other Non-mineral Surface Resources.

Under this alternative, mining operations would be approved as proposed in Sunroc's Plan with changes or additions needed to meet the environmental protection requirements of 36 CFR 228.8, and other requirements determined by the Forest Service to meet the need to protect other non-mineral National Forest resources.



S-1.7 DECISIONS TO BE MADE

The Forest Supervisor must decide whether to approve Sunroc's proposed Plan as submitted or whether to approve the Plan with changes and additions determined necessary to protect surface resources as provided for in 36 CFR 228.8.



CHAPTER 1 - PURPOSE OF AND NEED FOR ACTION

1.0 INTRODUCTION

This Environmental Impact Statement (EIS) considers the environmental, social, and economic effects of the United States Department of Agriculture, Manti-La Sal National Forest (Forest) approving the expansion onto National Forest System (NFS) lands by Sunroc Corporation's (Sunroc) Chicken Creek Gypsum Mine as proposed in Sunroc's *Notice of Intention to Commence Large Mining Operations at the Chicken Creek Mine* (EarthFax 2012), hereinafter referred to as the Plan, submitted to the Utah Division of Oil, Gas, and Mining (DOGM) and to the Forest for review. The EIS specifically addresses the consequences of implementing three alternatives, including the No Action Alternative (taking no further action to evaluate Sunroc's proposal), the Proposed Action (to approve the Plan as submitted by Sunroc), and approving the Plan with additional mitigation measures to protect Forest resources.

Chicken Creek East and Chicken Creek West mine sites comprise the Sunroc Gypsum Mine, located in Juab County, Utah approximately two miles east of Levan, Utah, on the west slope of the San Pitch Mountains (part of the Gunnison Plateau) within the Sanpete Ranger District of the Forest (**Figure 1.1**). The mining operations are divided into two parts, an East Mine and a West Mine, in portions of Sections 33 and 34, Township 14 South, Range 1 East, and Section 4, Township 15 South, Range 1 East, Salt Lake Base and Meridian (See **Figure 1.1** and **Figure 1.2**). The project can be accessed from the west via Chicken Creek Road, or from the east on Forest Road (FR) 101. This mine site has been permitted with the Division of Oil, Gas, and Mining (DOGM) since 1992 and is currently being mined by Sunroc Corporation. In January of 1991, the Forest Supervisor, approved a Plan of Operations for the Chicken Creek West Mine (USFS, 1991). In 2002 an additional Plan of Operations was approved for five acres of disturbance in the Chicken Creek East Mine (USFS, 2002).

The operator is currently proposing a supplement to its existing approved Plan under 36 CFR 228.4(d) to include additional NFS lands for surface mining that are not included in the currently approved plans and combine the existing plans into a Large Mine (defined by DOGM as greater than five acres) Plan of Operations. The Plan proposes to commence mining operations on NFS lands at the East Mine and Upper West Mine and continue mining operations at the Lower West Mine. In addition, it proposes an additional mine access road to the Upper Chicken Creek West Mine. Under the National Environmental Policy Act (NEPA) of 1969, the Forest, along with the cooperating agencies, are responsible for identifying and assessing potentially significant environmental impacts and addressing issues associated with the proposed mining operation on NFS lands. This analysis is tiered to the Land and Resource Management Plan Final Environmental Impact Statement, Manti-La Sal National Forest, 1986 and Record of Decision and Summary, November 5, 1986, as amended. This EIS discloses the direct, indirect, and cumulative environmental impacts that would result from the proposed action and alternatives. The decision will be documented in a Record of Decision (ROD) signed by the responsible official after the completion of the EIS process.





This document is organized into seven chapters:

- *Chapter 1. Purpose of and Need for Action:* The chapter includes information on the history of the project proposal, the purpose of and need for the project, and the Forest Service’s proposal for achieving that purpose and need. This chapter also details how the Forest Service informed the public and agencies of the proposal and how they responded.
- *Chapter 2. Alternatives:* This chapter provides a more detailed description of the Forest Service’s proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on issues raised by the public and other agencies. This section also provides a summary table of the environmental consequences associated with each alternative.
- *Chapter 3. Affected Environment and Environmental Consequences:* This chapter describes the existing environment and the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area. This chapter also includes mitigation measures proposed for each resource area.
- *Chapter 4. Consultation and Coordination:* This chapter provides a list of agencies consulted during the development of the EIS, and a list of those who received a copy of the Draft EIS.
- *Chapter 5. Preparers and Contributors:* This chapter provides a list of people involved in the preparation of this EIS and their roles or responsibilities.
- *Chapter 6. References:* This chapter provides the information associated with the references listed in the EIS.
- *Chapter 7. Comments and Responses:* This section provides direct responses to solicited public comments received during the formal comment period of the draft EIS.

1.1 PURPOSE AND NEED FOR ACTION

Sunroc has submitted a proposed supplement to their existing approved Plan that proposes to commence mining operations on NFS lands at the East and Upper West Mines and to expand mining operations at the Lower West Mine of the Chicken Creek Gypsum Mine. Sunroc holds the mineral rights in the proposed expansion to the Chicken Creek East Mine and leases the mineral rights in the proposed expansion to the Chicken Creek West Mine. The rights to enter and conduct mining operations are based on placer claims as noted in **Tables 1.1 & 1.2** and **Figure 1.2**. The purpose of the proposed action and the evaluation of alternatives to the proposed action are to determine if changes or additions to the Plan are required to meet the requirements of the regulations for environmental protection set forth in 36 CFR 228.8.



Table 1.1
East Mine Placer Claims

Name of Mining Claim	Location	Acreage
Chicken Creek 1E	W ½ SW ¼ NW ¼, S 34, T14S, R1E	20
Chicken Creek 2E	E ½ SW ¼ NW ¼, S 34, T14S, R1E	20
Chicken Creek 3E	W ½ SE ¼ NW ¼, S 34, T14S, R1E	20
Chicken Creek 4E	E ½ SE ¼ NW ¼, S 34, T14S, R1E	20
Chicken Creek 5E	W ½ SW ¼ NE ¼, S 34, T14S, R1E	20
Total:		100

Table 1.2
West Mine Placer Claims

Name of Mining Claim	Location	Acreage
Claim #1	SE ¼ SW ¼, S4, T15S, R 1E SW ¼ SE ¼, S4, T15S, R1E	80
Claim #2	Parts of Lots 4, 5, 6, 7, 8, 9, S4, T15S, R 1E	80
Claim #3	Parts of Lots 7, 8, 9, 10, 11, 12, S4, T15S, R 1E	80
Claim #4	Parts of Lots 10, 11, 12, 13, 14, 15, S4, T15S, R 1E	80
Total:		320

Analysis and approval of the Plan is needed so that Sunroc may expand their operations on NFS lands in order to continue operations of the Chicken Creek Mine for approximately 128 years. By completing the NEPA process Sunroc and the Forest Service will comply with the federal requirements to complete the NEPA process on actions which will take place on federal lands. Sunroc has a responsibility to conduct safe and environmentally sound practices within the operating areas and the Forest has the responsibility to manage surface resources on NFS lands. Forest Service mining regulations state that “operations shall be conducted so as, where feasible, to minimize adverse environmental effects on National Forest System surface resources (36 CFR 228.8).” The Forest Service may impose reasonable conditions on operations which do not endanger or materially interfere with prospecting, mining, or processing operations or reasonably incident uses (1955 Multiple Use Mining Act and case law).

The Forest Service is required under 36 CFR 228.5 to review a proposed plan of operations to conduct mining operations pursuant to the Mining Laws and to approve a plan that meets the environmental protection requirements of 36 CFR 228.8. Sunroc has a right to develop its claims as set forth by the General Mining Law of 1872 as amended. These laws provide the public with a statutory right to conduct prospecting, exploration, and development activities (1872 Mining Law and 1897 Organic Act), provided they are reasonably incident (1955 Multiple Use Mining Act and case law) to mining and comply with other federal laws.



1.2 MANAGEMENT GUIDANCE AND DIRECTION

This analysis incorporates management direction as provided in the *Manti-La Sal National Forest Land and Resource Management Plan* (USDA 1986), as amended (The Forest Plan). The Forest Plan establishes goals and objectives, standards and guidelines, and direction for the management of NFS lands administered by the Forest. This analysis also incorporates required mitigation measures included in *The Practical Guide to Reclamation in Utah* (DOGM, 2000).

1.2.1 Land and Resource Management Plan

The Forest Plan guides natural resource management activities on NFS lands administered by the Forest, and describes management goals and objectives, resource protection methods, and desired resource conditions. It was developed to meet the requirements of the National Forest Management Act of 1976 (NFMA) as well as other legal requirements for the management of the environment. The Forest Plan divides NFS lands into management areas based on resource needs and opportunities. The Sunroc mining project lies within the San Pitch Division Management Area and is within the Management Prescription for General and Key Big Game Winter Range Management Units.

Although the Forest Plan provides direction and guidance for management activities on NFS lands administered by the Forest, NFMA implementing regulations at 36 CFR 219.15(a) allow for exception of authorizations of occupancy and use from being consistent with a forest plan if the forest plan expressly allows such occupancy and use, permit, contract, and other authorizing instrument for such use and occupancy. The Forest Plan makes this allowance through the statement, “As soon as practicable after the Forest Plan is approved, the Forest Service will ensure that, subject to valid existing rights, all outstanding and future permits and other occupancy and use documents which affect National Forest System lands are consistent with the Forest Plan” (Forest Plan, p. III-1). The Sunroc mining operation is a valid existing right under the General Mining Law of 1872; thus, the approval of the Plan for activities necessary for mining is an authorization that is an exception from the regulatory requirement of consistency with the Forest Plan.

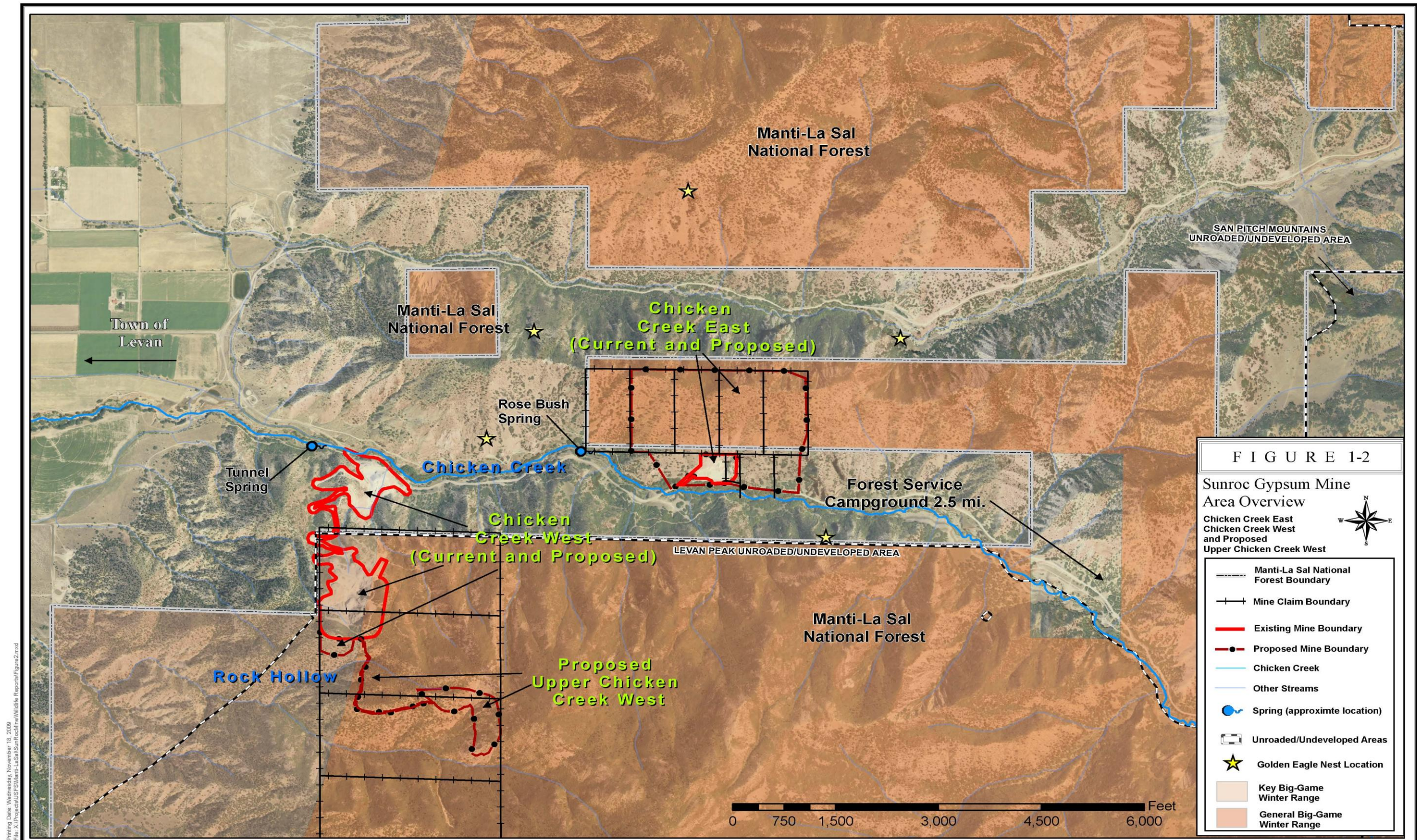
1.2.2 Interim Directive on Inventoried Roadless Areas on National Forests

The United States Court of Appeals for the Tenth Circuit decided *Wyoming v. USDA* on October 21, 2011 and found that the Forest Service’s adoption of the 2001 Roadless Area Conservation Rule (Roadless Rule) does not violate federal law. On March 1, 2012, in accordance with the Tenth Circuit opinion reversing the District Court’s issuance of a permanent national injunction on the Roadless Rule and remanding the case back to the District Court with instructions to vacate the injunction, the District Court issued an Order vacating the national injunction on the Roadless Rule. The instructions provided in the Secretary of Agriculture’s interim directive covering Inventoried Roadless Areas (IRAs) within the National Forests and Grasslands (Secretary’s Memorandum 1042-156) issued May 30, 2011 will continue to be followed. The directive gives ultimate approval or disapproval authority to the Secretary for forest management or road construction projects in IRAs. The directive ensures that USDA carefully considers activities in these IRAs while long term roadless policy is developed.



1.2.3 The Practical Guide to Reclamation in Utah

Utah Division of Oil, Gas, and Mining (DOGM) has published *The Practical Guide to Reclamation in Utah* (DOGM, 2000). This document consists of a collection of documented mine closure and environmental protection Best Management Practices (BMPs) that are required by DOGM. This guide is used as a reference to ensure that all mitigation measures suggested in this EIS meet DOGM requirements; however, the Forest is not required to use this guide in making its decision.





1.3 PROPOSED ACTION

Sunroc has submitted a proposed supplement to their existing approved plan of operations that proposes to commence mining operations on NFS lands at the East and Upper West Mines. The Plan proposes to expand mining operations at the Lower West Mine and to construct an access road and add additional mining on claims at the Upper West mine. The Plan proposes a total disturbance of 77.3 acres on NFS lands (66.0 acres of new disturbance + 11.3 acres of existing disturbance) and 37.1 acres on private lands (including new and pre-existing disturbances); refer to **Tables 1.3** and **1.4**, below.

Table 1.3
Disturbances to Forest Land
(excluding private land)

Description of Area	East Mine Acreage (all outside IRA)	West Mine Acreage (all within IRA)	Total Acreage
Existing Mining Claims on the Forest	100	320 (all leased)	420
Existing Mining Claims in Inventoried Roadless Area	0	320	320
Area within the Forest and within the Mine Boundary	78	179.04 (includes 11.3 acres existing disturbance)	257.04
Area within the Forest and within the Mine Boundary not currently disturbed	78	167.74 (excludes 11.3 acres existing disturbance)	245.74
Existing Disturbance on the Forest	0	11.3	11.3
Future Direct Disturbance on the Forest	41.3	24.7	66.0
Area within the Mine Boundary but outside existing or new Direct Disturbance	36.7	131.74 (excludes new and existing disturbance)	168.44
Mining Claim area within IRA but outside Mine Boundary	0	140.96	140.96

Table 1.4
Disturbances to Private Land
(excluding Forest land)

Description of Area	East Mine Acreage	West Mine Acreage	Total Acreage
Existing Disturbance on Private Land	2.1	6.9	9.0
Future Disturbance on Private Land	12.2	15.9	28.1



The Chicken Creek West Mine is divided into two parts, the current mine site (Lower West) and a proposed Upper West Mine, located southeast of the Lower West Mine.

Active mining is no longer occurring at the Chicken Creek East Mine on private lands in the bottom of Chicken Creek canyon. The East Mine is currently being used for a stockpile and crusher area. Sunroc is proposing to advance their mining operations north onto mining claims located on NFS lands. The actual extraction rates would vary depending upon mineral quality, Plan production requirements, and the economics of mining and plant operation. With only 150,000 tons allowable extraction annually under the Utah air quality permit between all three sites (East, Lower West, and Upper West) the mine could operate for approximately 128 years.

If the proposed mine expansions are approved, the Lower West Mine would increase its reserves by 1,950,000 tons, the Upper West Mine would increase its reserves by 1,900,000 tons, and the East Mine would increase its reserves by 15,340,000 tons. If each pit were to be mined individually and consecutively, the Lower West and Upper West mines would each have an additional mine life of approximately 13 years and the East Mine would have a mine life of approximately 102 years; however, the Plan proposes to operate the East Mine concurrently with, first, the Lower West Mine and then, second, (after the reserves are exhausted at the Lower West Mine) with the Upper West Mine. After the reserves at the Lower West Mine are exhausted, operations would begin at the Upper West Mine. Under this proposal the Lower and Upper West mines would have a mine life of approximately 26 years each and the East Mine would have a mine life of approximately 128 years.

Based on Section 106.2 of the Plan and the final proposed expansion of the three mine sites (East, West, and Upper West), mine production is expected to be approximately 150,000 tons of ore per year depending upon mineral quality, plant production requirements, and the economics of mining and plant operations. Total annual production is limited to 150,000 tons under the state issued air quality permit. Sunroc has stated that the currently permitted reserves at the West Mine will be depleted by late June 2012. Mining operations at the East Mine have already ceased due to the reserves on private land being depleted; Sunroc is currently waiting for permission to proceed onto NFS lands at that location.

1.3.1 Modification to Proposed Action between DEIS and FEIS

As part of the proposed action in the DEIS, the expansion of the mine onto NFS lands was believed to require a site specific Forest Plan amendment to change the visual resource designation of the area. Upon further review of the implementing regulations for the National Forest Management Act at 36 CFR 219.15(a) and the Forest Plan, and as explained in Section 1.2.1, the Forest has determined that a Forest Plan amendment would not be required under the Proposed Action.

1.4 DECISIONS TO BE MADE

The Forest Supervisor must decide whether to approve Sunroc's proposed Plan as submitted, and if it is approved, whether to approve the Plan with changes and additions determined necessary to protect surface resources as provided for in 36 CFR 228.8.



1.5 PUBLIC INVOLVEMENT

Legal Notices of Proposed Action for the environmental analysis of the Plan were published on May 14, 2008 in the *Nephi Times News* and the *Sanpete Messenger*. On May 13, 2008 the Legal Notice was published in the *Sun Advocate*. In addition 19 scoping letters were mailed to interested parties. Based on comments, both external and internal, it was determined an EIS was needed to analyze the proposed action. The Notice of Intent (NOI) to prepare an EIS was published in the *Federal Register* on August 1, 2008. The Forest Service received three responses to this notice. The responses were received from Utah Environmental Congress (UEC), the National Park Service (NPS), and the Environmental Protection Agency (EPA). The NPS letter stated that they had no comment. The EPA listed issues that they want addressed in the EIS; these issues included revegetation, erosion control, stream monitoring for dissolved and suspended solids and macro-invertebrate communities, dust suppression, and cumulative impacts. The letter from UEC expressed concern with mining in the existing Inventoried Roadless Area (IRA), viewshed impacts, impacts to golden eagles and their habitats, and impacts to big game habitat. The proposed action has been published in the Forest Service Schedule of Proposed Actions (SOPA) database. A range of alternatives has been formally adopted to address the purpose and need and to respond to issues identified in the EIS.

The Ute Tribe and Paiute Tribe were mailed a scoping letter. Copies of the cultural resource report were sent to the Ute Tribe, Hopi Tribe and the Paiute Tribe of Utah. No issues or concerns were identified by them.

The Notice of Availability (NOA) for the DEIS was published in the *Federal Register* on December 30, 2011. The 45 day comment period ended February 13, 2012. Two comment letters were received; one from the Environmental Protection Agency (EPA), Region 8 Headquarters in Denver, CO and one from the Department of the Interior, US Geological Survey (USGS), Denver, CO. The EPA provided comments on water resources, air quality, and environmental justice. The USGS commented on the migratory bird analysis and citations.

1.6 ISSUES

The following issues, identified through the project scoping process and team meetings, are addressed in further detail in the EIS. The issues have been used to develop alternatives and help direct data collection and the analysis process. This process identified significant issues pertinent to the development of alternatives to the proposed action. An issue is a point of debate, dispute, or disagreement regarding anticipated effects of implementing the proposed action. The evaluation criteria for each of the issues will be used to quantify impacts and compare alternatives.

The project scoping process also identified those issues outside the scope of this decision as non-significant issues. Non-significant issues include those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual



evidence. Non-significant issues are included in Section 1.6.2 - Issues Considered but Not Further Evaluated.

1.6.1 Key Issues

A. Impacts to Inventoried Roadless Areas (IRA) and Unroaded/Undeveloped Areas:

The proposed expansion to the Upper West Mine is within both the Levan Peak IRA and the inventoried boundaries of Levan Peak Unroaded/Undeveloped Area identified during the Manti-La Sal wilderness potential inventory. The Unroaded/Undeveloped areas are only inventoried areas (generically for wilderness potential); they have no current management classification. In the simplest terms, an unroaded area is defined as any piece of land that is not currently roaded (i.e. the area located between roads). They are analyzed to evaluate their “wilderness characteristics” as attributed to the “inventoried roadless areas”. The proposed road construction and mining would affect the area by adding roads, changing the landscape, decreasing wildlife habitat, decreasing visual quality, and increasing noise and air pollution in the area.

Evaluation Criteria: Impacts to seven wilderness attributes and nine roadless characteristics of the inventoried areas will be evaluated for each alternative. Wilderness attributes include: (1) untrammeled, (2) natural, (3) undeveloped, (4) opportunities for solitude, (5) opportunities for primitive recreation, (6) special features, and (7) manageability. Roadless characteristics include: (1) soil, water, and air resources, (2) sources of public drinking water, (3) diversity of plant and animal species, (4) habitat for TES and species dependent on large undisturbed areas of land, (5) primitive and semi-primitive classes of recreation, (6) reference landscapes for research study or interpretation, (7) landscape character and integrity, (8) traditional cultural properties and sacred sites, (9) and other locally unique characteristics.

B. Mine expansion and access roads could segment wildlife habitats and cause avoidance of winter range: Portions of the proposed expansion to the mine are within key and general big game winter range.

Evaluation Criteria: Acres of disturbance and avoidance within the key and general big game winter range and the number of months of protection will be used to evaluate impacts to big game and other wildlife.

C. Mining may impact individuals, or habitat of, Threatened, Endangered, and Sensitive Species (TES), Management Indicator Species (MIS), and Migratory Birds: The proposed Plan (Sunroc, 2009) could result in impacts to TES, sensitive species, and Forest Plan Management Indicator Species (MIS).

Evaluation Criteria: Acres of habitat impacted (due to mining) or avoided, that are suitable as habitat for threatened, endangered, sensitive, or MIS species. The analysis will evaluate the percentage of total habitat that will be impacted or avoided and the number of months of protection.



- D. Visual Resources:** The proposed expansion of the mine sites would impact the visual resources and visual quality of the area. The mine expansion would enter an area that is currently categorized as Partial Retention; a visual quality which, in general, means man's activities may not be evident and must remain subordinate to the characteristic landscape (Forest Plan, 1986). An increase in the mining activities would impact the visual quality of the area by creating areas of disturbance that can be seen from several locations and by changing the character of the land.

Evaluation Criteria: Changes to the existing landscape character type as measured by acres of disturbed area will be used as one of the evaluation criteria. A visual resource analysis will be completed to address Forest visual resource characteristics. Also an analysis on the visual impacts that can be seen from the town of Levan and other locations, including the I-15 corridor, will be conducted. The other evaluation criteria will be whether the project area and alternatives meet the Visual Quality Objectives (VQOs) established in the Manti-La Sal National Forest Land and Resource Management Plan.

- E. Socioeconomics:** If the mine does not continue operations then there would be a loss of all the jobs (12 – 15 employees) at the Chicken Creek Mine (East, Lower West, and Upper West). This loss of jobs would impact socioeconomics because of the loss of revenue to the workers, Sunroc, and the state and county taxes that are paid by Sunroc. There would also be a loss of a necessary commodity. If the proposed Plan is approved there would be approximately 52 years of available reserves at the West Mine and 128 years of available reserves at the East Mine at the proposed rate of mining.

Evaluation Criteria: Socioeconomic impacts will be evaluated using quantitative and qualitative methods. The quantity of gypsum that could be mined and sold from the proposed mining areas will be analyzed. Wages earned over the course of mining operations, and benefits to the local economy from the mining operation will be analyzed (including taxes paid by the mine). A qualitative discussion of the potential impacts to employees and communities from job loss if the mine did not continue to operate will also be included in the analysis. A discussion of possible impacts to socioeconomic conditions from the continued operation of the mine will also be discussed.

- F. Water Resources:** Mining operations are presently occurring at the West Mine but are not currently ongoing at the East Mine. Mining operations at the East Mine would begin again following approval of the Plan. Removal of vegetation, blasting, excavation of ore, movement of other earth materials, ore stock piles, mine traffic, and construction of additional mining haul roads could all impact the quality and quantity of ground water which in turn may impact springs located in the area of the mining operations. Increased road traffic on the County road due to renewed mining operations at the East Mine could also impact the water quality of Chicken Creek and the springs directly by increasing the sediment load in surface drainage. The ground water is influenced from surface water runoff. Surface water infiltration may decrease because of surface mining activities at all



mine sites. The quantity and quality of ground water recharge and spring discharge could be impacted from up-gradient and up-slope mining activities.

Evaluation Criteria: A hydrogeologic evaluation will be used to assess the potential water resource impacts with special emphasis being placed on the potential to impact water resources in the Chicken Creek watershed and Juab Valley.

1.6.2 Issues Considered but Not Further Evaluated

A. Air Quality

Issues: Operating an open pit mine and crushing area would create emissions from machinery and other operating equipment. Fugitive dust from haul roads, crushing activities, blasting, and excavating could decrease air quality. Regardless of the amount or type of equipment used, State and Federal air quality standards must be met. The Operator (Sunroc) is required to have a valid air quality permit issued by the State of Utah, Department of Environmental Quality. The Chicken Creek Gypsum Mine is currently operating under Air Approval Order (AO) DAQE-AN0130720005-10, issued and administered by the Utah Department of Environmental Quality, Division of Air Quality (UDAQ) (Appendix C). Operations must be in compliance with the conditions contained in this AO. As part of this AO, the mine has decreased its hours of operation from 24 hours per day to 16 hours per day, but will continue to produce at the same daily production rate. Total annual production is limited to 150,000 tons under the AO. The Chicken Creek Mine is located in Juab County, Utah, and in an attainment area for all National Ambient Air Quality Standards (NAAQS). The AO did go through a public comment period, all the comments were evaluated and addressed, and there were no comments that would adversely affect the AO. Therefore, the issue of air quality will not be discussed further in this document.

B. Soil and Vegetation

Issues: The proposed expansion of the mine could result in the need for more extensive reclamation processes for soil and vegetation. Slope steepness and stability need to be ensured through soil retention and protection. This EIS (Appendix B) and the Plan (Appendix 106-2B) include Soil and Water Conservation Practices (SWCPs) and BMPs and other design features which are measures intended to improve soil and vegetation protection and to enhance slope stability during all mine operation and maintenance phases. These SWCP's and BMP's are designed to improve soil and vegetation protection by salvaging and storage of topsoil, enhance slope stability, and reduce impacts from sedimentation and erosion (e.g., by the use of berms, erosion control blankets, sandbag barriers, mulch and mulch tackifier, silt fences, and/or straw-bale barriers). These SWCP's, BMPs, and design features are required for all mining operations and will be followed for all alternatives considered. This issue will not be carried forward through this EIS.

C. Cultural and Paleontological Resources

Issues: Mining could impact cultural sites by disturbing them or destroying them. A cultural resource inventory has been completed for the proposed mine (Earthtouch, 2005) and no sites were identified. On August 1, 2005 the Utah State Historic Preservation Office (SHPO)



concurred with the determination that there would be no historic properties affected by the proposed project. No previously recorded sites are situated within or near any of the proposed mine locations and there are no known Sacred Sites or Traditional Cultural Properties located in or near the San Pitch Mountains. The Ute Tribe and Paiute Tribe were mailed a scoping letter. Copies of the cultural resource report were sent to the Ute Tribe, Hopi Tribe and the Paiute Tribe of Utah. No issues or concerns were identified by them.

No paleontological resources are known to be located within the Project Area. If either cultural sites or paleontological resources should be found during operations of the mine, activities would stop in the area of the site, and the Forest Service would be contacted. This issue will not be carried forward for further analysis in this EIS.

D. Noxious Weeds

Issues: Disturbance of existing vegetation and soils and use of heavy equipment from other areas could result in the introduction and establishment of noxious weeds. The Plan for the mine includes measures for noxious weed prevention and control. This issue will not be carried forward for further analysis in the EIS.

E. Range

Issue: This area is not currently used as rangeland, and the Forest Service does not foresee future use for range. Forest Service data shows that there are no range improvements in the area. For these reasons this resource is outside the scope of this analysis and will not be carried forward for further analysis in the EIS.

F. Timber

Issue: This area is not considered suitable for timber harvesting; therefore this issue is outside the scope of this analysis and will not be carried forward for further analysis.

G. Recreation and Transportation

Issues: There is a concern that mining activities could impact recreation and transportation activities on NFS lands resulting from increased noise and truck traffic on Chicken Creek Road. There is a campground located approximately 2.5 miles east of Chicken Creek East Mine. The area is also used for dispersed camping, and ATV and snowmobile use (on the roadway). The distance between the East Mine and the campground would provide enough distance to buffer the sound and mining does not continue during nighttime hours. The road to access Chicken Creek Canyon from the west is a Juab County road. The haul road to the mine has been constructed to accommodate ore trucks and local traffic. The truck traffic speed on the road is controlled through the conditions outlined in the air quality permit at 15 miles per hour. Traffic on the road may be delayed for 30 minutes to 1 hour when blasting is being done. These intermittent traffic delays are anticipated to have only a minor impact to recreational opportunities in the area. Mining closes down for the winter from about late October through late March each year. This issue will not be carried forward for further analysis.



1.7 PERMITS AND AUTHORIZATIONS

The implementation of the proposed action or alternatives would require a decision by the Forest Service with consultation and coordination with other federal, state, and local agencies. **Table 1.5**, below, identifies agencies, types of actions, and descriptions of permits or actions that may be required. This list is not all inclusive and other permits or approvals may be required depending on decisions made and which regulatory processes are in effect at the time of operation. The Forest Service will ensure compliance with any laws or regulations pertaining specifically to the Forest Service, including their NEPA responsibility. The government agencies identified in **Table 1.5** would be responsible for enforcing the laws or regulations under their jurisdictions.

Table 1.5
Permits, Approvals, and Consultation That May Be Required For Implementation

Agency	Type of Action	Description of Permit of Action
Federal		
Forest Service	Forest Service Decision	The Forest Service decision regarding this proposal would approve the plan of operations with necessary changes and additions to satisfy environmental protection requirements of 36 CFR 228A.
	Preparation of Biological Assessment	In accordance with the Endangered Species Act, the Forest Service must complete a Biological Assessment assessing the impact of the Proposed Action on federally listed threatened and endangered species.
	Preparation of Biological Evaluation and Wildlife Report	In compliance with agency policy, a Biological Evaluation and Wildlife Report must be prepared, assessing potential impacts to Forest Service sensitive plant and animal species, Management Indicator Species, and Priority Bird Species.
Environmental Protection Agency (EPA)	Review and comment regarding:	Under NEPA, the Environmental Protection Agency is required to review and comment on “major federal actions that have a substantial impact on the human environment.” The EPA’s responsibility and role is to provide scoping comments, review EISs, and provide information and appropriate technical assistance during and following the environmental analysis process. Specific environmental legislation for which the EPA is responsible and which may be applicable to the proposal is shown to the left. Administrative and enforcement responsibilities have been delegated to the State of Utah for all three acts. The EPA may be involved in 404 permitting in association with USACE.
	Clean Air Act, as amended, 42 U.S.C.A. Section 7410-762 (PL 95-604, PL 95-95)	
	Federal Water Pollution Control Act, as amended by the Clean Water Act, 33 U.S.C.A. Section 1251-1376 (PL 92-500, PL 95-217)	
	Safe Drinking Water Act, 42 U.S.C.A Section 300F-300J-10 (PL 93-523)	
	Clean Water Act, Section 404 Permit	



Agency	Type of Action	Description of Permit of Action
U.S. Fish and Wildlife Service (USFWS)	<p>Endangered Species Act, Section 7 Consultation</p> <p>Fish and Wildlife Coordination Act consultation</p> <p>Section 404 Permit Consultation</p> <p>Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act and consistency with Executive Order E.O. 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds)</p>	<p>If impacts to federally listed species are possible, the USFWS will consult with the Forest Service and issue a Biological Opinion. The USFWS also coordinates with the Forest Service in accordance with the Fish and Wildlife Coordination Act and reviews Section 404 permit applications to avoid adverse impacts to federally listed species.</p> <p>If impacts to migratory birds or bald and golden eagles are possible, the USFWS will be contacted to discuss methods for minimizing and/or mitigating impacts and obtaining take permits, if applicable.</p>
State of Utah		
Department of Environmental Quality		
Division of Air Quality (DAQ)	<p>Review and comment</p> <p>Issuance of Approval Orders</p>	The Division's review ensures that state and federal air quality standards are not exceeded. Approval Orders are required for certain stationary emissions sources. The Approval Order for the Chicken Creek Mine will need to be updated and approved.
Division of Water Quality (DWQ)	<p>Review and comment</p> <p>Section 401 certification</p> <p>Section 303(d) compliance</p>	The Division's review ensures that state and federal water quality standards are not exceeded. Section 401 certification would be required for any point-source discharge and is obtained in conjunction with a Section 404 permit. Review water quality impacts on impaired water bodies as listed under Section 303(d). Currently, the Plan (Sunroc, 2009) includes measures that prevent runoff from affecting adjacent waters, or undisturbed areas. A Section 401 certification or Section 303(d) compliance should not be required.
Department of Natural Resources		
Division of Wildlife Resource (DWR)	Review and comment	The Division is responsible for management and protection of state wildlife and fish resources.
Division of Water Resources	Review and comment	The Division is responsible for determining adequacy of water supply and cumulative impacts on water supply.
Division of Oil, Gas and Mining (DOGM)	Mining Permits	The Chicken Creek Mine permit number is: M230016, this permit must be current in order for mining operations to continue.
Department of Community and Culture		
State Historic Preservation Office	Consultation on National Historic Preservation Act, Section 106 compliance process	Responsible for making sure that Federal Agencies carry out their responsibilities under Section 106 of the National Historic Preservation Act.



1.8 AVAILABILITY OF PROJECT RECORDS

The project record is located at the Supervisor's Office, Manti-La Sal National Forest, 599 West Price River Drive, Price, Utah. Additional project data are present in the project record and are hereby incorporated by reference.

1.9 BEST AVAILABLE SCIENCE

The techniques and methodologies used in this analysis consider the best available science. The analysis includes a summary of credible scientific evidence which is relevant to evaluating reasonably foreseeable impacts. The analysis also identifies methods used and references scientific sources relied on. Information was reviewed, considered and incorporated where relevant.



CHAPTER 2 - ALTERNATIVES

2.0 INTRODUCTION

This chapter describes the alternatives for Sunroc's Plan. The Plan proposes to (1) add additional mining on claims on NFS lands to the Chicken Creek East and Chicken Creek West mine sites, and (2) construct an access road and add additional mining on claims on NFS lands to the Upper Chicken Creek West area within the mining claims. The Plan proposes additional disturbance of 66.0 acres on NFS lands (+11.3 acres existing) and 28.1 acres on private lands (+ 9.0 acres existing). This chapter describes the alternative formulation process, alternatives considered but eliminated from detailed study, and alternatives considered in detail.

2.1 DEVELOPMENT OF ALTERNATIVES

Preliminary alternatives that were developed prior to the scoping process by the Forest Interdisciplinary Team (IDT) included a No Action Alternative and a Proposed Action Alternative.

During scoping, concerns were raised about the impact of the proposal on the following resources:

- Unroaded and Undeveloped Areas (i.e. areas identified during Forest Planning with potential for wilderness designation)
- Wildlife habitats
- Threatened, endangered, sensitive, and Management Indicator species
- Visual resources
- Socioeconomic resources
- Air quality
- Soil and vegetation
- Water Resources (ground water/surface water quantity and quality)
- Cultural and paleontological resources
- Noxious weeds
- Recreation and transportation

Of the issues raised, only six Key issues were carried forward for further analysis (Refer to Section 1.6). The Key issues include: 1) Unroaded and Undeveloped areas; 2) Wildlife Habitats; 3) Threatened, Endangered, Sensitive and Management Indicator species; 4) Visual Resources; 5) Socioeconomics; and , 6) Water Resources. The other issues that were discussed in Chapter 1



were considered issues not requiring further discussion in this document or issues that are outside the scope of this analysis (Section 1.6.2).

2.2 DESCRIPTION OF ALTERNATIVES

NEPA requires the identification of a reasonable range of alternatives to the proposed action. All alternatives should address the purpose and need and the issues raised during scoping, and they should avoid or mitigate adverse environmental impacts associated with the proposed action. Alternatives that are not reasonable based on inconsistency with purpose and need do not need to be analyzed in detail. An EIS must also address the No Action alternative, disclosing the effects of not undertaking a federal action.

The alternative formulation criteria are; (1) the alternative meets the rights and requirements of the mining claimant; (2) the alternative meets Forest Plan objectives and direction, developed to meet legal and other mandated requirements for natural resources management; (3) the alternative minimizes effects to other resources; and (4) the alternative meets the purpose and need. The No Action Alternative and two action alternatives (approve the Plan as presented by Sunroc Corporation, or to approve the Plan with changes and additions necessary to minimize adverse environmental impacts on National Forest surface resources) will be analyzed and considered in detail.

2.2.1 Alternatives Considered in Detail

2.2.1.1 Alternative One (No Action Alternative) – Do Not Approve the Plan.

NEPA requires consideration of a “No Action” alternative. Under Alternative One, current approved operation plans would continue to guide the mining operation. Sunroc would continue to operate the mine, but no expansion to additional areas on the Forest would occur in the Lower West Mine, the Upper West Mine, or the East Mine. Future mining operations could only continue on private lands unless a new plan of operations is submitted and approved under a future analysis process.

Under the No Action Alternative Sunroc would not expand its mining operations on NFS lands and would only continue its operations in the previously approved mining areas. With the current approved operations 11.3 acres on NFS lands have already been disturbed.

The following operational mitigation and post-operational reclamation criteria are requirements of the currently approved mining plan:

- Reclamation procedures are included as part of the Plan. The Plan discusses soil salvaging and stockpiling, terracing requirements, recontouring of disturbed areas, and reclamation of runoff control structures/features and roads.
- Revegetation procedures are also discussed in the Plan for areas that will be temporarily or permanently disturbed during mining operations. The discussion addresses selection of appropriate plant species, soil preparation, seeding rates, and seeding methods.



- SWCPs and BMPs are included as part of the Plan (Appendix 106-2B) and are in effect for use during all mining operations and maintenance phases to improve soil and vegetation protection by salvaging and storage of topsoil, enhance slope stability, and reduce impacts from sedimentation and erosion by the use of berms, erosion control blankets, sandbag barriers, mulch and mulch tackifier, silt fences, and/or straw-bale barriers.

2.2.1.2 Alternative Two (Proposed Action) – Approve the Plan of Operations as Submitted.

Under this alternative, mining activities on Forest lands would be approved at the Chicken Creek East and West Mines as proposed in the Plan. SWCPs and BMPs for water quality, air quality, protection of wildlife and their habitats, other resources, and reclamation are specified in the Plan and this EIS.

The proposed Plan is to (1) add additional NFS lands that can be mined at the Chicken Creek East and Chicken Creek West mines, (2) construct an access road and add additional acreage to be mined in the Chicken Creek Upper West Mine, and (3) increase the mining operations on private land. The Plan proposes a disturbance of 77.3 acres on NFS land (11.3 acres of existing disturbance on the West Mine + 66.0 acres of future disturbance on the East and West Mines = 77.3 acres) and 37.1 acres on private land (9.0 acres of existing disturbance + 28.1 acres of future disturbance = 37.1 acres).

The West Mine is divided into two parts, the current mine site (Lower West) and a proposed (Upper West) site located southeast of the current site. The proposed Upper West Mine would require the construction of 0.5 miles (1.6 acres) of road in the Levan Peak unroaded/undeveloped area and the Levan Peak IRA. The West Mine expansion would result in an additional 24.7 acres of surface disturbance within the IRA. With the currently approved operations 11.3 acres have already been disturbed or mined within the IRA. Because the Proposed Action would require activities within the Levan Peak IRA, the Secretary of Agriculture would need to concur with the activities in accordance with the Interim Directive on Inventoried Roadless Areas as described in Section 1.2.2.

Active mining is occurring at the East Mine on private property near the base of the canyon's north slope. Sunroc is proposing to advance their mining operations north onto mining claims located on NFS lands. The proposed mining at the East Mine would result in 41.3 acres of future direct disturbance on NFS lands.

Future mining production will be based on market requirements. Under the proposed mining plan, approximately 1,950,000 tons of gypsum (corresponding to 13 years of mining) would be added to the permitted reserves at the Lower West Mine; approximately 1,900,000 tons (corresponding to 13 years of mining) would be added to the permitted reserves at the Upper West Mine; and approximately 15,340,000 tons (corresponding to 102 years of mining) would be added to the permitted reserves at the East Mine. These production year estimates are based upon the current Air Quality Permit that restricts production to 150,000 tons per year. The Plan



proposes to operate the East Mine concurrently with, first, the Lower West Mine and then, second, (after the reserves are exhausted at the Lower West Mine) with the Upper West Mine. The Lower West Mine and Upper West Mine would be mined consecutively, not concurrently. After the reserves at the Lower West Mine were exhausted, operations would begin at the Upper West Mine. Under this proposal the Lower and Upper West mines would have a mine life of approximately 26 years each (for a total of 52 years) and the East Mine would have a mine life of approximately 128 years.

Based on the current Plan and the final build out (i.e. the complete expansion of the Chicken Creek Mine) of the three mine sites (East, West, and Upper West), the mining operations are expected to remove approximately 150,000 tons of material per year for approximately 128 years from the East Mine; 52 years of mining operations would occur within the IRA at the Lower and Upper West Mines. If this removal number is expected to increase a new environmental document will need to be completed to approve a change to the Plan.

The following operational mitigation and post-operational reclamation criteria are part of the Plan under Alternative Two:

- Reclamation procedures are included as part of the Plan. The Plan discusses soil salvaging and stockpiling, terracing requirements, recontouring of disturbed areas, and reclamation of runoff control structures/features and roads.
- Revegetation procedures are also discussed in the Plan for areas that will be temporarily or permanently disturbed during mining operations. The discussion addresses selection of appropriate plant species, soil preparation, seeding rates, and seeding methods.
- SWCPs and BMPs are now included as part of the Plan (Appendix 106-2B) and are in effect for use during all mine operations and maintenance phases to improve soil and vegetation protection by salvaging and storage of topsoil, enhance slope stability, and reduce impacts from sedimentation and erosion by the use of berms, erosion control blankets, sandbag barriers, mulch and mulch tackifier, silt fences, and/or straw-bale barriers.
- The golden eagle nests within Chicken Creek and Pigeon Creek will be monitored by a qualified Wildlife Biologist from the U.S. Forest Service in accordance with the U.S. Fish and Wildlife Service Utah Raptor Guidelines (USDI, U.S. Fish and Wildlife Service 2002) and the Golden Eagle Monitoring Plan agreed to by Elaine Zieroth, Forest Supervisor (USDA, Forest Service 2002) and inventories for new nests will be conducted annually within ½ mile radius of mining operations. Searches will concentrate on suitable nest cliffs, and will be primarily ground-based during the courtship/nest building period (February 1st – March 1st) and will only occur during years when mining is occurring.
- Mining activities for the Chicken Creek Mine will be modified to accommodate golden eagle nesting in accordance with the U.S. Fish and Wildlife Service Utah Raptor Guidelines (USDI, U.S. Fish and Wildlife Service 2002) and the Golden Eagle



Monitoring Plan agreed to by Elaine Zieroth, Forest Supervisor (USDA, Forest Service 2002), if it is determined by a qualified U.S. Forest Service Wildlife Biologist that mining activities could cause nest abandonment or failure. Refer to the Golden Eagle Monitoring Plan (USDA, Forest Service 2002) for specific mitigation measures.

- To accommodate wintering elk and deer, the mine will stop operations from November 15th to March 1st.

2.2.1.2.1 Modification to Proposed Action

As part of the proposed action in the DEIS, the expansion of the mine onto NFS lands was believed to require a site specific, non-significant Forest Plan amendment to change the visual resource designation of the area. Upon further review of the implementing regulations for the National Forest Management Act at 36 CFR 219.15(a) and the Forest Plan, and as explained in Section 1.2.1, the Forest has determined that a Forest Plan amendment would not be required under the Proposed Action.

2.2.1.3 Alternative Three (Preferred Alternative) – Approve the Plan of Operations with Additional Conditions Needed to Protect Other Non-mineral Surface Resources.

Under this alternative, mining operations would be approved as proposed in the Plan with any changes or additions needed to meet the environmental protection requirements of 36 CFR 228.8, and other requirements determined by the Forest to meet the need to protect other non-mineral Forest resources.

The proposed Upper West Mine would require the construction of 0.5 miles (1.6 acres) of road in the Levan Peak unroaded/undeveloped area and the Levan Peak IRA. The West Mine expansion would result in an additional 24.7 acres of disturbance within the IRA (11.3 acres of disturbance now exists within the IRA; 24.7 acres additional + 11.3 acres existing = 36.0 acres total). Because Alternative Three would require activities within the Levan Peak IRA, the Secretary of Agriculture would need to concur with the activities in accordance with the Interim Directive on Inventoried Roadless Areas.

In addition to the operational mitigation and post-operational reclamation criteria described above for Alternatives One and Two, the following mitigation and reclamation criteria under Alternative Three would also be required:

- Raptor nests, other than golden eagles, found within the area of mining activity, would be protected by spatial buffers for active nests in accordance with the U.S. Fish and Wildlife Service Utah Raptor Guidelines (USDI, U.S. Fish and Wildlife Service 2002), if it is determined by a qualified U.S. Forest Service Wildlife Biologist that mining activities could cause nest abandonment or failure. Seasonal buffers may be recommended from various mining activities (blasting, excavation, hauling, crushing, and other disturbance activities) and can vary depending on the species, from 0 – 8 months.



- Mule deer and Rocky Mountain elk occur in the Project Area and timing restrictions will be placed on the mining operation during the winter months, i.e., December 1- April 15 to prevent impacts to wintering big game (**Figure 3.3**).
- If any cultural or paleontological resources are uncovered during mining operations, all operations in the area will stop, and the Manti-La Sal Forest Supervisor will be contacted.
- During mining operations, vehicle operations will be restricted to the designated mine roads.
- Noxious weeds will be controlled during mining operations in compliance with state and county requirements.
- Topsoil Salvage and Storage.
 - A record must be kept for topsoil salvage, which would include the location, size, and depth of topsoil salvaged. The record would also include the cubic yards of salvaged topsoil, the location of storage, and a running tally of total cubic yards in storage to verify salvage amounts.
 - Store salvaged soil in a manner that minimizes southwest sun exposure, maximizes surface area, and minimizes soil depth.
 - The topsoil stockpile should be isolated to minimize contamination from mine related dusts, protected from flooding, and seeded promptly, since plants and their residue control wind and water erosion and maintain microbial activity.
 - Topsoil stockpiles will be protected by controlling and eliminating establishment of noxious weeds and invasive plants.
- An annual ore production report will be submitted to the Forest Service.
- Mined out areas will be reclaimed one section at a time as active mining operations progress into other areas of the mine.
- All overburden shall be retained on-site for use during reclamation efforts.

2.2.2 Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14).

One of the alternatives evaluated included provisions limiting Sunroc's access to the Upper West Mine Site until all of the mineable gypsum was removed from the West and East Mine Sites. Although Sunroc has stated in the Plan that mining at the Upper West Mine is not planned until all of the reserves are depleted at the Lower West Mine, placing the additional restriction on Sunroc that all reserves must first be removed at the East Mine as well would only temporarily restrict access to the Upper West Mine and would not address any specific issues or change the overall effects of mining; therefore, this alternative was not analyzed further.



There were no other alternatives evaluated and eliminated from detailed study.

2.2.3 Comparison Summary of Alternatives

Table 2.1, Comparison of Alternatives, displays the components of each alternative and the physical changes to the environment likely to occur from the project for each alternative. These changes are not in themselves identified as issues, but would cause changes to resources and the socioeconomic setting and, therefore, form the basis for the identified issues.

Table 2.1 Comparison of Alternatives

Issue: IRA & Unroaded/Undeveloped	Alternative 1	Alternative 2	Alternative 3
a. Miles of new road	0	0.5	0.5
b. Disturbed area due to road (acres)	0	1.6	1.6
c. Disturbed area due to mining (acres)	11.3	34.4	34.4
d. Total disturbed area (acres, inc. road)	11.3	36.0	36.0
e. Disturbance as % of IRA	~0.06	~0.18	~0.18
f. Disturbance as % of Unroaded	~0.1	~0.31	~0.31
g. Duration of operations (years)	1	52	52

Issue: Wildlife Habitat Avoidance	Alternative 1	Alternative 2	Alternative 3
a. Habitat fragmentation of elk & deer			
1. *Potential area avoided by elk & deer (acres)	~20	114 – 257	114 – 257
2. Adjacent areas that provide alternative access	Yes	Yes	Yes
3. Decrease in populations (%)	0	0	0
4. Months of protection	3.5	3.5	4.5
b. Raptor habitat affected			
1. *Potential area affected (acres)	~20	114 – 257	114 – 257
2. Alternative habitat available	Yes	Yes	Yes
3. Decrease in populations (%)	0	0	0
4. Months of protection	0	0	0 – 8

*Potential area avoided/affected is dependent upon species and season.

Issue: TES & MIS	Alternative 1	Alternative 2	Alternative 3
a. Habitat fragmentation of TES			
1. *Potential area avoided by TES (acres)	~20	114 – 257	114 – 257
2. Adjacent areas that provide alternative access	Yes	Yes	Yes
3. Decrease in populations (%)	0	0	0
4. Months of protection	0	0 – 8 (golden eagle)	0 – 8 (all raptors)



b. Habitat fragmentation of MIS			
1. *Potential area avoided by MIS (acres)	~20	114 – 257	114 – 257
2. Adjacent areas that provide alternative access	Yes	Yes	Yes
3. Decrease in populations (%)	0	0	0
4. Months of protection	0	0 – 8	0 – 8

*Potential area avoided/affected is dependent upon species and season.

Issue: Visual Resources	Alternative 1	Alternative 2	Alternative 3
a. Meets Forest VQOs	No	No	No
b. Change to landscape character (acres of new disturbance)	0	66	66

Issue: Socioeconomics	Alternative 1	Alternative 2	Alternative 3
a. Employment gain/loss (no. of jobs)	Loss of 12-15	No Change	No Change
b. Property taxes gain/loss per year (\$)	Loss of 8,400	No Change	No Change
c. Commodity gain/loss per year (tons)	Loss of 150,000	No Change	No Change

Issue: Water Resources	Alternative 1	Alternative 2	Alternative 3
a. Water quality	Potential adverse impacts	Greater potential for adverse impacts	Greater potential for adverse impacts
b. Water quantity	Potential adverse impacts	Greater potential for adverse impacts	Greater potential for adverse impacts



CHAPTER 3 - AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.0 INTRODUCTION

Chapter 3 provides a description of existing conditions for affected resources, and the potential environmental consequences that could result from implementing the proposed project or alternatives as described in Chapters 1 and 2. During the Scoping process, the public and agencies identified resources and issues that are important for inclusion in the analysis of the proposed project. Resource topics described and analyzed in Chapter 3 include: A. Inventoried Roadless Areas and Unroaded/Undeveloped Areas; B. Wildlife; C. Threatened, Endangered, and Sensitive Species (TES), Management Indicator Species (MIS), and Migratory Birds, D. Visual Resources, E. Socioeconomics (including Environmental Justice), and F. Water Resources.

The location and extent of the cumulative effects analysis area varies with each resource topic. For this project, most resources were evaluated within the Project Area bounded by the future proposed mine boundaries of all three mining areas (i.e. Chicken Creek East, Chicken Creek West, and Upper West), and the area between the mine area boundaries (**Figure 1.2**). Some resources, such as socioeconomic conditions, required a broader study area and are described in the individual resource sections. Information about the affected environment for each resource was the baseline by which the potential impacts of the project were identified and measured.

Impacts may be direct or indirect, cumulative, short-term or long-term, beneficial or adverse, as described below:

- *Direct effects* are caused by the action and occur at the same time and place.
- *Indirect effects* are caused by the action, are later in time or farther in distance, but are still reasonably foreseeable.
- *Cumulative effects* result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of the agency or person who undertakes them (federal or non-federal). Cumulative effects for the resource topics are addressed in Section 3.10.
- *Short-term* impacts, for the purpose of this project, are those changes to the environment that occur during mining activities within 30 years.
- *Long-term* impacts are defined as those that would persist beyond or occur after the mining has been completed (30 years or longer).
- Impacts can be *beneficial* (positive), or *adverse* (negative).

The significance of the effects on the quality of the human environment requires the consideration of both *context* and *intensity*:



- *Context* means the action must be assessed in several contexts, which will vary with each project, including society as a whole, the affected region, short and long term impacts, affected interests, and the locality.
- *Intensity* means the severity of the impact, and should include consideration of such factors as impacts to public health, effects to unique resources, impacts to public lands or resources, impacts to endangered or threatened species, level of controversy, and level or risk of uncertainty.

3.1 UNROADED AND UNDEVELOPED AREAS & INVENTORIED ROADLESS AREAS

3.1.1 Introduction

The project area is within the Levan Peak Inventoried Roadless Area (Levan Peak IRA) which was established prior to December 1999 and currently protected by the 2001 Roadless Area Conservation Rule. The Secretary of Agriculture Interim Directive on Inventoried Roadless Areas on National Forests guides management of IRAs. Refer to Section 1.2.2 for a discussion of this directive. Other guidance for these areas is the Forest Plan and its amendments.

The project is also within the Levan Peak Draft Unroaded and Undeveloped area. Draft unroaded and undeveloped areas were identified through the effort to revise the Forest Plan and may meet the minimum definition of wilderness and qualify for wilderness evaluation in concurrence with the NFMA, implementing regulations that were in place at the time (36 CFR 219.17, 1982 edition). These areas were identified according to the direction in the “Intermountain Region Planning Desk Guide: A Protocol for Identifying and Evaluating Areas for Potential Wilderness” (USDA, 2004).

The policy guiding evaluation of wilderness attributes is contained in Forest Service Handbook 1909.12 – Chapter 70; Wilderness Evaluation.

Wilderness attributes or qualities that characterize potential wilderness areas include:

- Untrammeled – This attribute monitors modern human activities that directly control or manipulate the components or processes of ecological systems inside wilderness;
- Natural – This attribute monitors both intended and unintended effects of modern people on ecological systems inside wilderness since the time the area was designated;
- Undeveloped – This attribute monitors the presence of structures, construction, habitations, and other evidence of modern human presence or occupation;
- Solitude – This attribute measures the opportunities to experience isolation from the sights and sounds of management activities inside wilderness and the presence of others.



- Opportunities for primitive recreation – This attribute measures the experiences available without developments and to feel a part of nature, with a high degree of challenge and reliance on outdoor skills rather than facilities.
- Special Features – This is an attribute that recognizes that wilderness may contain other values of ecological, geologic, scenic or historical or cultural significance.
- Manageability – This attribute is a measure of the ability to manage an area to meet the size criteria (5,000 + acres), the resulting configuration of the potential wilderness, and the interaction of the other elements listed above.

Roadless Area Characteristics are described by the following categories:

- Soil, water, and air resources – This characteristic identifies any unique or critical watershed resources.
- Sources of public drinking water – This characteristic identifies any public drinking water systems or sources within the project area or that would be affected by the project.
- Diversity of plant and animal communities – This characteristic discusses the diversity of plant and animal communities.
- Habitat for TES and species dependent on large undisturbed areas of land – This characteristic identifies ant TES or sensitive species within the Roadless Area.
- Primitive and semi-primitive classes of recreation – This characteristic describes current recreation opportunities within the Roadless Area.
- Reference landscapes for research study or interpretation – This characteristic describes the landscape that is present and any unique reference landscapes that exist within the Roadless Area.
- Landscape character and integrity – This characteristic describes the current scenic quality and character of the area.
- Traditional cultural properties and sacred sites – This characteristic identifies any significant cultural resources within the Roadless Area.
- Other locally unique characteristics – This characteristic identifies any locally unique features.

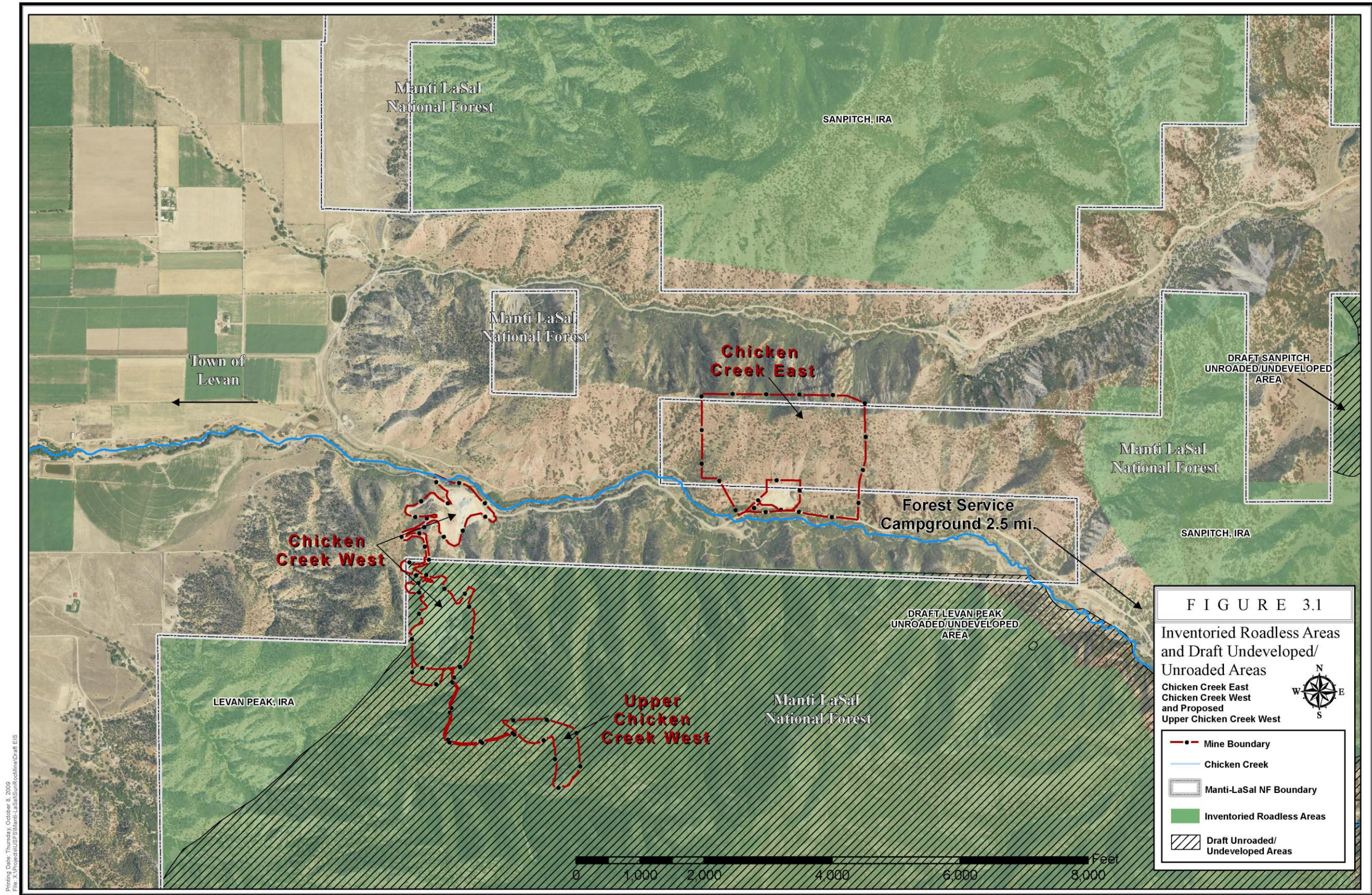
3.1.2 Affected Environment

The proposed West Mine expansion would occur within the Levan Peak IRA and the Draft Levan Peak Unroaded and Undeveloped Area (**Figure 3.1**). Main access to the area is via Chicken Creek Road, National Forest System Road (NFSR) 50101. The Levan Peak IRA is approximately 22,092 acres and the Draft Unroaded and Undeveloped Area is approximately 11,471 acres. The proposed expansion of the West Mine would involve constructing a road that crosses the IRA and the Draft Unroaded/Undeveloped area to access the Upper West Mine. The proposed activity would directly impact the same number of acres (24.7 acres of additional



Chapter Three – Affected Environment and Environmental Consequences

disturbance) within the IRA and the Draft Unroaded/Undeveloped area as both areas overlap in the Project Area. For ease of discussion and analysis, because these areas overlap, they will be discussed as one general area called the Levan Peak Roadless Area where appropriate.





The Wilderness Attributes for the Levan Peak Undeveloped/Unroaded Area and the Roadless Area Characteristics for the Levan Peak Inventoried Roadless Area are summarized in **Table 3.1**.

Table 3.1
Wilderness Attributes and Roadless Characteristics

Wilderness Attributes	Existing Conditions
Untrammeled	A cherry-stemmed road intrudes deeply into the area and connects with a motorized trail. This motorized activity is a sign of modern human control or manipulation.
Natural	The motorized trail essentially bisects the area thereby affecting the naturalness of the area. In addition a communication site is located in the center of the area and can be viewed throughout much of the area.
Undeveloped	There is a communication site located in the center of the area and can be viewed throughout much of the area.
Solitude	In canyons, or on ridges, there is an opportunity for solitude. There are a few non-motorized trails, but with very limited development.
Opportunities for Primitive Recreation	Primitive camping is possible. The area is bisected by roads and motorized trails. There are not many opportunities for challenging wilderness experiences in the area owing to the limited degree of solitude.
Special Features	There are no specific special features identified in the areas.
Manageability	Manageability of the area for wilderness is good because of the dense vegetation and steep slopes. Although there is a potential for travel by OHV on ridges and up canyons around the perimeter this area is not heavily used by OHVs.
Roadless Area Characteristics	Existing Conditions
Soil, Water, and Air Resources	<p>The soil found in nearly all of the mine expansion area is colluvium and residuum derived from shale; the soil in a small area within the southeast portion of the mine boundary is colluvium and residuum derived from limestone.</p> <p>Watersheds within the unit provide irrigation and community water supplies for Levan, UT and the lower Sevier River farmlands. The Lower West Mine is in</p>



	<p>the Chicken Creek watershed. The Upper West Mine is in the Rock Hollow watershed which drains west into Juab Valley. Near surface ground water is generally believed to follow topographic features and to be facilitated by flow through fractures in the Arapien Shale.</p> <p>The mine operates under an air quality permit issued by the Utah Department of Air Quality. The permit limits ore production to 150,000 tons per year.</p>
Sources of Public Drinking Water	<p>The Lower West Mine is in the lower part of the Chicken Creek watershed. This is within a portion of the source area for Tunnel Spring, part of the public water supply for Levan, UT.</p>
Diversity of Plant and Animal Species	<p>Vegetation ranges from climax pinyon-juniper communities at lower elevations through oak and mountain brush communities to a sagebrush-forb/grass community at upper elevations. Spruce-fir communities occur on north facing slopes, aspen stands are scattered at higher elevations.</p> <p>Forest sensitive species with suitable habitat within the project area include the bald eagle, peregrine falcon, Townsend's big-eared bat, spotted bat, and Columbia River spotted frog.</p> <p>Wildlife habitat for several species is found within the IRA. Identified species utilizing the area include Rio Grande turkey, snowshoe hare, ruffed grouse, blue grouse, mule deer, elk, moose, and black bear. Deer and elk use the area throughout the year. It is a calving/fawning and security area.</p>
Habitat for TES and Species Dependent on Large Undisturbed Areas of Land	<p>The only T&E species considered as possibly having suitable habitat on NFS lands within the project area is the Ute Ladies'-tresses. This species is not known to occur on the Forest; however, given the presence of a perennial stream (Chicken Creek) just outside the mine property on private land and since site-specific surveys for the species have not been conducted, the presence of Ute Ladies'-tresses cannot be discounted.</p> <p>Elk and mule deer are species found in the project area that utilize large undisturbed areas of land.</p>



Primitive and Semi-Primitive Classes of Recreation	There are a few non-motorized trails but with very limited development; therefore, primitive camping is possible. Primitive recreation such as camping, hiking, and seeing nature undisturbed is possible.
Reference Landscapes for Research Study or Interpretation	Areas are present within the IRA that provide reference landscapes existing in a natural, unmanaged setting.
Landscape Character and Integrity	The steep rocky slopes of the area contrast sharply with the gentle valley below in terms of topography, vegetation, color, texture, and scale. Several factors intrude upon the landscape integrity including two cherry stem roads, a highly developed communication site that can be seen throughout much of the area, and 11.3 acres of existing mine disturbance.
Traditional Cultural Properties and Sacred Sites	A cultural resource inventory of the project area was conducted in July 2005. Another six cultural resource inventories have been conducted previously. Two were conducted for the Chicken Creek Mine, two others were conducted at the Henry Mine (3 miles to the South), and two more were conducted for oil exploration seismic projects in the San Pitch Mountains. No cultural resources were found in the mine expansion area.
Other Locally Unique Characteristics	There are two electronic sites in the southern part of the IRA, an upper site and a lower site. These sites are accessed by a high clearance Special Use road. The road is under permit and not part of the Forest transportation system. It has never been gated so hunters and an occasional recreationalist with a high clearance vehicle can drive into the area.

3.1.3 Impacts

3.1.3.1 Alternative One (No Action Alternative) – Do Not Approve the Plan

Under the No Action Alternative, no new development would be associated with the Chicken Creek Gypsum Mine other than what is already approved. The mine areas and mine operations would continue to operate as currently permitted. The status of Levan Peak Roadless Area, with respect to their potential for inclusion in the inventory of wilderness areas, would be unchanged.

3.1.3.2 Alternative Two (Proposed Action) – Approve the Plan of Operations as Submitted

The proposed mining activities and associated haul/access road construction would disturb an additional 66.0 acres of Forest land. This includes 5.3 acres to expand the Lower West Mine, 1.6 acres (0.5 mile) of new road construction to access the Upper West Mine, 17.8 acres to open the Upper West Mine (all in the Levan Peak Roadless Area), and 41.3 acres of disturbance to Forest land at the East Mine (not in Roadless). These disturbances would result in both short and long-term impacts depending



upon the characteristics affected. The impacts are summarized in **Table 3.2** and discussed below. All of the surface disturbance would be reclaimed following mining activities.

Table 3.2
Impacts to Wilderness Attributes and Roadless Characteristics Under Alternative Two

Wilderness Attributes	Impacts
Untrammeled	There would be approximately 24.7 acres of additional disturbance within the Roadless Area that would be disturbed by road construction and mine expansions (in addition to the 11.3 acres of existing disturbance) bringing the total disturbance to 36.0 acres. This would change the character of the area by adding additional human activity. The mining operations are expected to last approximately 52 years within the IRA; therefore, the road and mine pits would cause long-term impacts. The road and mine pits would be reclaimed once mining was completed; however, the stepped appearance left behind after reclamation in the former excavation pits would noticeably change the topography from an untrammeled appearance. The level of effort described in the Plan would result in the untrammeled appearance being permanently lost after mining operations ceased.
Natural	An additional 24.7 acres of vegetation and wildlife habitat would be directly impacted by road and mine pit construction (24.7 new + 11.3 existing = 36.0 total). This is a long-term impact. Reclamation of the access road to the Upper West Mine could be accomplished in such a way as to restore its natural appearance; however, the natural appearance of the mine pits themselves would not be restored based upon the reclamation techniques described in the Plan. The natural characteristic of the pit areas themselves would be permanently lost.
Undeveloped	The area proposed for the Upper West Mine is currently undeveloped. The impacts to the undeveloped characteristic of the area resulting from the road construction and mining operations would be long term. The mine pit and road would be reclaimed once mining activities are complete. Reclamation of the access road to the Upper West Mine could be accomplished in such a way as to restore its



	undeveloped appearance; however, the undeveloped appearance of the mine pits themselves would not be restored based upon the reclamation techniques described in the Plan. The undeveloped characteristic of the overall landscape would be permanently adversely impacted.
Solitude	Once mining activities commence at the Upper West Mine, the area could not support opportunities for solitude while mining operations and reclamation were taking place. Mining and reclamation would occur over approximately 57 years (52 years mining + 5 years reclamation). This is a long-term impact.
Opportunities for Primitive Recreation	Once mining activities commence at the Upper West Mine, the area could not support opportunities for primitive recreation while mining operations and reclamation were taking place. Mining and reclamation would occur over approximately 57 years (52 years mining + 5 years reclamation). This is a long-term impact.
Special Features	There are no special features (including cultural sites) that would be impacted by the proposed action
Manageability	A new temporary road would be constructed within the Roadless Area for the life of the mine, which could be approximately 52 years in the IRA. The Forest Service could feasibly use this road to access other sections of the Roadless Area for management purposes. However, with the addition of a roadway and a mine in the Roadless Area it would be difficult to manage the area as roadless. Without incorporation of a controlled access gate after mine closure, the manageability of the IRA would be impacted. This is a long-term impact.
Roadless Area Characteristics	Impacts
Soil, Water, and Air Resources	<p>Approximately 24.7 acres of new disturbance is proposed in the IRA. Soils will be salvaged and stockpiled prior to mining. Soils will remain stockpiled until the regraded slopes are ready for redistribution of the stockpiled soil materials. Following mining, the area will be regraded to final contours and ripped. The stockpiled soils will be distributed and re-seeded.</p> <p>Pre-mining drainage features will be replaced with</p>



	<p>diversion channels and retention ponds. Some of the natural infiltration may be lost due to mining practices.</p> <p>Air quality will not change from the currently approved mining activities.</p>
Sources of Public Drinking Water	<p>The 5.3 acres of proposed disturbance at the Lower West Mine are within Tunnel Spring's source area. Some minor amount of infiltration is projected to be lost due to mining operations. The retention ponds are expected to prevent total suspended solids from impacting water quality at Tunnel Spring. Tunnel Spring is monitored for flow volume continuously and water quality on a quarterly basis. Any changes in quantity or quality would be detected.</p>
Diversity of Plant and Animal Species	<p>The proposed 24.7 acres of disturbance within the IRA would result in only minimal impacts to the diversity and viability of vegetation species found in the project area.</p> <p>24.7 acres of wildlife habitat would be adversely impacted.</p>
Habitat for TES and Species Dependent on Large Undisturbed Areas of Land	<p>Ute Ladies'-tresses: Potential habitat for this species does not occur on NFS lands within the project area, as the only drainages occurring on NFS lands are intermittent, are dry during the summer except after a large rain event, and are therefore not expected to contain wetland habitat. No known populations of Ute ladies'-tresses would be directly or indirectly impacted in the study area under Alternatives Two and Three, as this species has not been documented within the Forest. The proposed road accessing the Upper Chicken Creek West Site would cross an intermittent drainage. However, since this portion of the drainage only contains water seasonally during runoff, and based on the dryness of other drainages in the area, this would not be considered suitable habitat for Ute ladies'-tresses. No ground disturbance would occur in the riparian areas associated with Chicken Creek, where potentially suitable habitat for this orchid occurs. Therefore, no effects to Ute ladies'-tresses are anticipated under Alternative Two or Three.</p> <p>Bald eagle, peregrine falcon, Townsend's big-eared bat, spotted bat, and Columbia spotted frog (Forest Sensitive Species): The proposed project may impact</p>



	<p>individuals, but is not likely to cause a trend towards federal listing.</p> <p>Elk and Mule Deer: The proposed disturbances would equate to a loss of less than 0.5 percent of the elk and mule deer key and general winter range within the Sanpitch Mountains. Activities that could lead to avoidance include visual disturbance, human encounters, and noise. Avoidance during winter months could reduce fitness of elk and could lead to local population reductions. If activities led to long-term avoidance of the mine area, it could ultimately contribute to the limiting factors of elk and mule deer populations through long term loss of habitat. Habitat fragmentation is also a concern due to loss of habitat from mine expansion and if long-term avoidance occurs. Expansion of the mine and mine activities may interrupt seasonal movements of elk and mule deer and cause them to avoid previously utilized portion of winter range. Avoidance of these winter habitats could result in habitat loss outside of the current and proposed mine boundaries.</p> <p>Avoidance impacts to wintering elk and mule deer due to disturbance from mining activities would be minimized, under Alternative Three, by requiring timing restrictions on mining activities during the big game wintering period, December 1 – April 15 (see Section 3.3.4).</p>
Primitive and Semi-Primitive Classes of Recreation	The reclaimed mine-scape would decrease the possibility of experiencing primitive and semi-primitive classes of recreation.
Reference Landscapes for Research Study or Interpretation	The available area within the IRA that provides reference landscapes existing in a natural, unmanaged setting would be diminished.
Landscape Character and Integrity	The 24.7 acres of new disturbance at the West and Upper West Mines would result in additional color, form, and texture contrast. During the 128-year life of the mine, bare ground and linear features (i.e. roads) would be visible from the valley. After reclamation, contrasts in land form would still be apparent over the long-term. Even if revegetation was successful, a series of vegetated benches and unvegetated high walls would create a striped visual affect that would be



	visible from the valley further permanently impacting the landscape integrity of the area.
Traditional Cultural Properties and Sacred Sites	Since no cultural resources were found in the mine expansion area, no known resources would be impacted. If cultural resources were encountered during the course of mining operations, mining would stop in that area until the proper federal and state authorities were contacted to evaluate the find.
Other Locally Unique Characteristics	There would be no impacts to any other locally unique characteristics.

Many of these characteristics are related to other resources and are described in other sections of this EIS regardless of whether the resource is located within an IRA or Unroaded/Undeveloped Area. These include: diversity of plant and animal communities, including fish and wildlife (Section 3.2), threatened, endangered, sensitive, and management indicator species occurrence/habitat (Section 3.3), migratory birds (Section 3.4), visual resources (Section 3.5), and water resources (Section 3.7)

Untrammeled and Natural Characteristics

Vegetation and Diversity of Plant and Animal Communities:

As shown in **Table 3.3**, an additional 24.7 acres of habitat (refer to Section 3.2.2.1 for a more descriptive discussion of habitat) would be disturbed within the Levan Peak Roadless Area under Alternative Two. This would result in long-term impacts. These impacts to vegetation and habitats, described in Sections 3.2, 3.3, and 3.4 would not change the Diversity of Plant and Animal Communities within the Roadless Area, and no known unique habitats exist where disturbances would occur. These impacts to vegetation would represent less than 0.5 percent of the vegetation within the Levan Peak IRA and Unroaded/Undeveloped areas. The entire disturbance would occur on existing (leased by Sunroc) mining claims, which have not previously been disturbed.

Undeveloped

Visual Resources and Aesthetics:

The Levan Peak Roadless Area has a Visual Quality Objective (VQO) of Partial Retention as described in Section 3.5, but the VQOs are deviating from the Partial Retention VQO because of the dominance of the existing mine. During mining operations (52 years) the Levan Peak Roadless area would continue to deviate from the Partial Retention VQO standards. After reclamation, the mine areas could seasonally meet the VQO of Modification. For more information about the visual impacts analysis see Section 3.5.

Natural Integrity and Appearance:

The natural integrity and appearance would decrease in localized areas under Alternative Two mining activities, and road construction would contribute to the physical and/or man-caused impacts evident within the Roadless Area. Mining activities and road construction would be evident to the casual observer and thus the appearance of naturalness in localized areas would be reduced over the long-term.



Outstanding Opportunities for Solitude or a Primitive and Unconfined Type of Recreation

With regard to wilderness attributes for the Levan Peak Roadless Area, mining activities associated with Alternative Two could result in localized degradation of wilderness attribute ratings. These impacts would be temporary, but would also be short- and long-term. Some areas would be reclaimed as other mining activities are occurring, but the entire mining area cannot be reclaimed until mining is complete and there would be mining noise until all mining activities were completed. Therefore, some areas may not be reclaimed for approximately 52+ years within the IRA.

Opportunities for Solitude:

The attribute of opportunities for solitude would decrease in localized areas under Alternative Two as mining activities and vehicles using roads would result in noise. Mining activities and road construction in localized areas would result in reduction of solitude during the period when these activities were occurring. The restoration of opportunities for solitude, after cessation of mining operations, would depend upon the amount of effort put into restoration of disturbed areas to return them to their current levels.

Opportunities for Primitive Recreation:

The opportunity for primitive recreation in the roadless area would decrease in localized areas from mining activities and road construction. Some areas could permanently contain evidence of human occupation and/or activities. The restoration of opportunities for primitive recreation, after cessation of mining operations, would depend upon the amount of effort put into restoration of disturbed areas to return them to their current levels.

Challenging Experience:

The mining activities and road construction would further reduce the area's opportunities for challenging experiences. Increasing the extent of mining activities and road construction in the area would decrease the feeling of self-reliance.

Manageability

Disturbance from mining activities and road building would reduce the manageability of the Roadless Area for wilderness characteristics as these would introduce additional evidence of human occupation and activities. Surface disturbance and noise from mining activities may reduce the area for wilderness manageability, and may require this area (the mining area) to be removed from the Roadless Area. However, a large enough area (5,000 acres) in the IRA could still be achieved and it could still be considered an IRA. Less than 0.5 percent of the IRA would be impacted by the mining activities associated with Alternative Two, including a new road and pit area, and over 11,400 acres of the Unroaded/Undeveloped Area would still exhibit wilderness attributes.



3.1.3.3 Alternative Three (Preferred Alternative) – Approve the Plan with Additional Conditions Needed to Protect Other Non-Mineral Surface Resources

Impacts from Alternative Three would be the same as those described for Alternative Two in Section 3.1.3.2 except timing restrictions for mule deer and elk would reduce affects to wilderness attributes in the short-term by curtailing mining activities from December 1 – April 15 each year. Timing restrictions could temporarily increase opportunities for solitude and primitive recreation by reducing disturbance from mining activities and vehicle use on roads. These timing restrictions could enhance the recreational experience for wildlife viewing as well because the opportunity to see deer or elk may increase during the restricted period.

3.2 WILDLIFE

3.2.1 Introduction

This section of the EIS is a description of the wildlife resources within the study area. Numerous site visits were conducted by Forest Biologists and golden eagle monitoring has been ongoing for several years. Forest biologists provided existing wildlife reports (USFS, 2011a and 2011b) and Geographic Information System (GIS) data for the study area. These reports serve as baseline data for the study area. Species data were also obtained from the Utah Division of Wildlife Resources (UDWR) and other available sources for literature or resources (i.e., aerial photography).

The Federal regulatory environment for wildlife in the study area includes the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; BGEPA), Executive Order (E.O.) 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds), and the Endangered Species Act (ESA). The MBTA ensures that all migratory birds and their parts, including eggs, nests, and feathers, will be fully protected. The MBTA is the law that implements treaties for the protection of shared migratory bird resources signed by the United States with Canada, Japan, Mexico, and Russia. Bald and golden eagles are afforded legal protection under the authority of the BGEPA. Compliance with the BGEPA would be warranted should active golden eagle or bald eagle nests be discovered within or near the project area. Executive Order 13186 directs departments and agencies to take certain actions to further implement the MBTA. Specifically, the Order directs Federal agencies, whose direct activities will likely result in the take of migratory birds, to develop and implement a Memorandum of Understanding (MOU) with the United States Fish and Wildlife Service (USFWS) that shall promote the conservation of bird populations. The ESA, and species protected under it, are discussed in greater detail in Section 3.3.

3.2.2 Affected Environment

This section presents an overview of the habitat and wildlife species known or potentially present in or near the project area.

3.2.2.1 Habitat

The current mining operations at the Chicken Creek Mine occur on steep slopes at elevations between



6,000 and 7,000 feet. Mining occurs at two sites within the Chicken Creek drainage. The East Mine is located on a south-facing slope dominated by rock outcrops and exposed soil. The Lower West Mine occurs on a more heavily vegetated north-facing slope of oakbrush, true mountain mahogany, and juniper. The proposed Upper West Mine is sparsely vegetated with oakbrush and juniper among rock outcrops. The Upper West Mine would be situated on a west-facing slope that would drain into Rock Hollow.

The study area, which is the boundary of mine sites (not just the area that would be mined) and the area between sites, consists of six land cover types (habitats): barren rock outcrop or ledge, cottonwood/brush, oakbrush, true mountain mahogany, Utah Juniper woodland, and disturbed (**Table 3.3 and Figure 3.2**). The true mountain mahogany cover type is most common in the study area (51 acres) and is a mountain brush community dominated by mountain mahogany (*Cercocarpus montanus*) and is important for wintering big game. Much of the study area (20 acres) is barren or sparsely vegetated, evident in part by the rock outcrop cover type. The cottonwood/brush cover type consists primarily of cottonwood (*Populus* spp.), willow (*Salix* spp.), and/or alder (*Alnus* spp.), and is associated with streams and springs (i.e., Chicken Creek). The oakbrush cover type consists predominantly of early seral Gambel's oak (*Quercus gambelii*). The juniper woodland type is a scrub woodland dominated by Utah juniper (*Juniper osterosperma*) and also is important habitat for wintering big game. The disturbed cover type includes all areas within the active mine sites that contain no vegetation. **Figure 3.2** shows vegetation in currently disturbed areas, but the mining activity can be seen below the vegetation coverage. The vegetation shown is what would be there if there had been no mining activity.

Table 3.3
Land Cover Types by Land Ownership (acres¹) Within the Project Area (USDA, 2005)

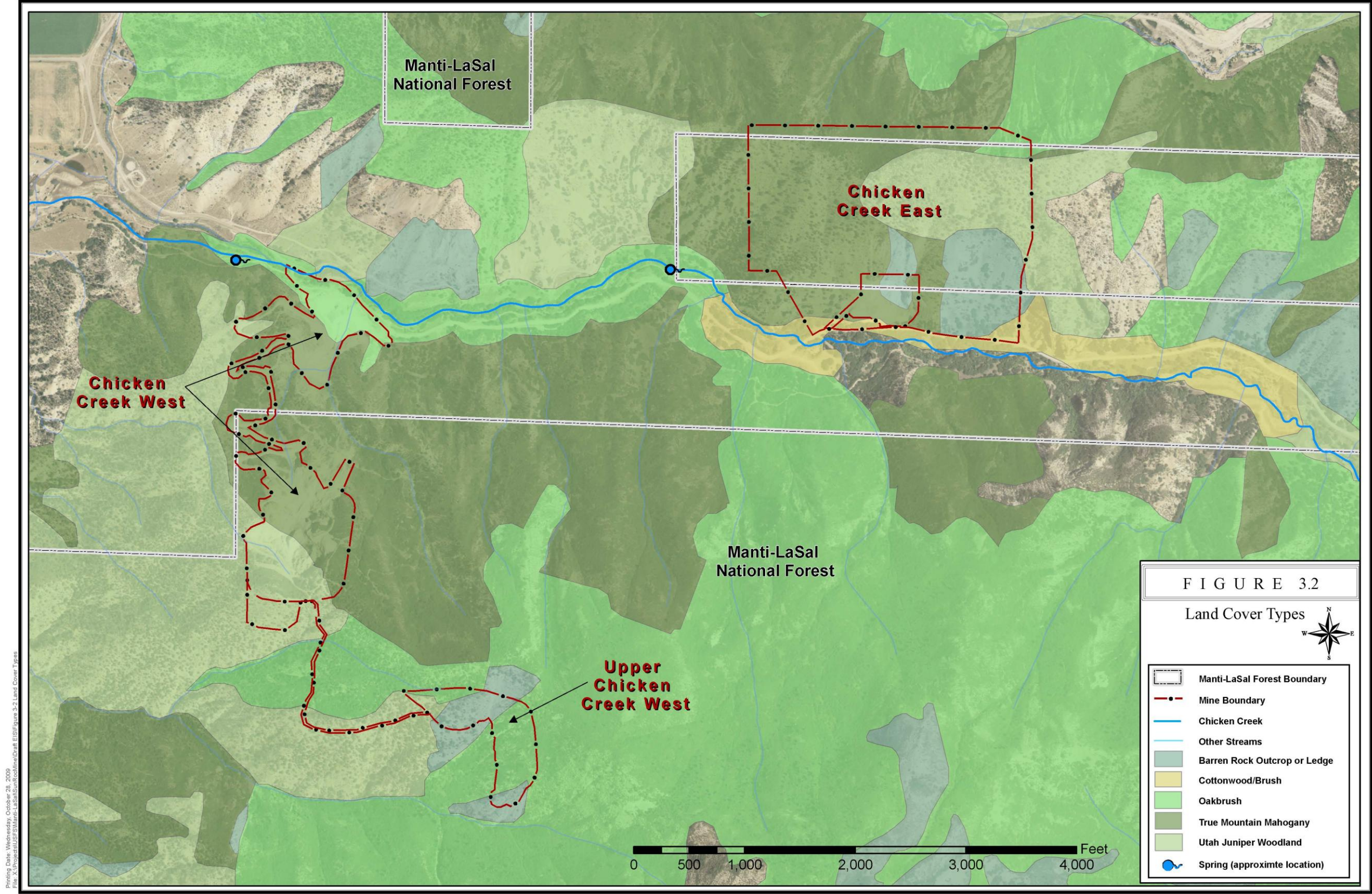
Land Cover Type	Habitat Present	USFS	Private	Total
Barren Rock Outcrop or Ledge	Sparsely vegetated	13	17	30
Cottonwood/Brush	Cottonwood, willow, alder; associated with streams and springs	0	1	1
Oakbrush	Predominantly Gambel's oak	13	1	14
True Mountain Mahogany	Mountain brush community dominated by mountain mahogany	0	0	0
Utah Juniper Woodland	Scrub woodland areas dominated by Utah juniper	40	9	49
Total		66	28	94

¹ Acreages are estimates based on the USFS GIS coverage rounded to the nearest acre.

One perennial stream, Chicken Creek, runs adjacent to the roadway located in the bottom of Chicken Creek Canyon; the stream is just north of the West Mine and south of the East Mine. Minor amounts of



wetland habitat are associated with the perennial stream. One intermittent stream drains from the West Mine area north into Chicken Creek. A second intermittent stream crosses the proposed access road of the Upper West Mine and drains to the west. This second intermittent stream is a tributary to Rock Hollow, which terminates in a canal west of the town of Levan and south of Chicken Creek. Due to the dryness of these channels during the summer months, neither of these intermittent streams are expected to contain wetland habitats within the project area.





3.2.2.2 Wildlife Species

Numerous species of mammals, birds, reptiles and amphibians, and fish could occur within the study area. The following sections describe those species that were either observed by Forest Service personnel during field visits to the area, or that are likely to occur. The potential for specific species to occur within the project area is based on known ranges and the habitat present.

Mammals

The project area has the potential for a variety of common mammal species to occur. Most of these species are nongame animals. Big game animals that occur within the area are mule deer (*Odocoileus hemionus*) and Rocky Mountain elk (*Cervis canadensis nelsonii*) which are Forest Management Indicator Species. There is seasonally important range present for both species within the study area. The Forest identifies the project area as “Key” and “General” winter range under the Forest Plan. Refer to **Figure 3.3** (page 3-22) for the location of these critical habitat areas. Refer to Section 3.3.2.2 – Description of Sensitive Species and Management Indicator Species, for a more detailed discussion of elk and mule deer.

A list of other mammals, and their habitats that may be present in the study area, is included in **Table 3.4**.

Table 3.4
Mammals that may be Present in the Project Area and Their Habitat Preference

Common Name	Scientific Name	Habitat/Land Cover Preference
Big brown bat	<i>Eptesicus fuscus</i>	Woodland and urban areas, Utah Juniper woodland
Big free-tailed bat	<i>Nyctinomops macrotis</i>	Rocky and woodland areas, Utah Juniper woodland and/or barren rock outcrop or ledge
Black bear	<i>Ursus americanus</i>	Forested areas; oakbrush, mountain mahogany, and/or Utah juniper woodlands
Black-tailed jackrabbit	<i>Lepus californicus</i>	Brushlands of foothills and valleys; mountain mahogany, oakbrush, and/or woodland areas
Bobcat	<i>Lynx rufus</i>	Mountains with thick undergrowth, Utah juniper woodlands
Brush mouse	<i>Peromyscus boylii</i>	Rocks and heavy brush, oakbrush or mountain mahogany areas
Bushy-tailed woodrat	<i>Neotoma cinerea</i>	High elevation rocky areas; barren rock outcrop or ledges
Coyote	<i>Canis latrans</i>	Deserts, grasslands, forests, and urban areas; any one of the land cover types listed in Table 3.5
Deer mouse	<i>Peromyscus</i>	Deserts, grasslands, and coniferous



Chapter Three – Affected Environment and Environmental Consequences

Common Name	Scientific Name	Habitat/Land Cover Preference
	<i>maniculatus</i>	forests; mountain mahogany and Utah juniper woodland
Elk	<i>Cervus Canadensis</i>	Mountain meadows; mountain mahogany and Utah juniper woodland
Hoary bat	<i>Lasiurus cinereus</i>	Woodland areas, Utah juniper woodland
Least chipmunk	<i>Neotamias minimus</i>	Deserts to mountain forests; mountain mahogany, oakbrush, Utah juniper woodland, and cottonwood/brush
Little brown myotis	<i>Myotis lucifugus</i>	Man-made structures, caves, and hollow trees; Barren rock outcrop or ledges, mountain mahogany, Utah juniper woodland, and disturbed areas
Long-eared myotis	<i>Myotis evotis</i>	Forested areas with rocky outcrops; barren rock outcrop or ledges, mountain mahogany, and Utah juniper woodland
Long-legged myotis	<i>Myotis volans</i>	Pine forests, deserts, and riparian areas; cottonwood/brush areas
Long-tailed vole	<i>Microtus longicaudus</i>	Forests, mountain meadows, sagebrush, and riparian areas; cottonwood/brush and mountain mahogany
Long-tailed weasel	<i>Mustela frenata</i>	Habitat generalist, meaning it is found in all types of habitats and does not require a specific habitat
Merriam's shrew	<i>Sorex merriami</i>	Arid sagebrush, grasslands, and mixed woodlands
Mountain lion	<i>Felis concolor</i>	Mountainous areas
Mule deer	<i>Odocoileus hemionus</i>	Mountain meadows; mountain mahogany and Utah juniper woodland
North American porcupine	<i>Erethizon dorsatum</i>	Coniferous forests, mixed forests, riparian, desert, and shrubland areas; can be found in several of the land cover types listed in Table 3.5
Northern pocket gopher	<i>Thomomys talpoides</i>	High elevation prairies, meadows, and open forest areas; can be found in several of the land cover types listed in Table 3.5
Northern raccoon	<i>Procyon lotor</i>	Habitat generalist
Ord's kangaroo rat	<i>Dipodomys ordii</i>	Grassland, shrubland, and woodland areas less than 7000 feet in elevation; cottonwood/brush, oakbrush, mountain mahogany
Rock squirrel	<i>Spermophilus variegatus</i>	Rocky areas, open plains, or forest areas; can be found in most of the land cover types listed in Table 3.5



Common Name	Scientific Name	Habitat/Land Cover Preference
Striped skunk	<i>Mephitis mephitis</i>	Open areas in grasslands and meadows, and urban settings; disturbed areas, oakbrush, and/or mountain mahogany
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	Near forested areas below 9000 feet
Western harvest mouse	<i>Reithrodontomys megalotis</i>	Heavily vegetated areas near water; cottonwood/brush areas
Western small-footed myotis	<i>Myotis ciliolabrum</i>	Broad range of elevations in many types of habitat

Source: Utah Division of Wildlife Resources, Utah Conservation Data Center (UDWR, 2009)

Reptiles and Amphibians

Lizards may occur in all habitats in the study area, but may be absent or uncommon in disturbed areas. Some species, such as the ornate tree lizard (*Urosaurus ornatus*) may occur in the riparian habitat along Chicken Creek. The common sagebrush lizard (*Sceloporus graciosus*) is found in sagebrush and pinyon-juniper habitats. The greater short-horned lizard (*Phrynosoma hernandesi*) may be found in open areas in habitats from grasslands to high mountains.

Several species of snake may occur in the study area, including common gartersnake (*Thamnophis sirtalis*), Eastern racer (*Coluber constrictor*), gopher snake (*Pituophis catenifer*), Great Basin (western) rattlesnake (*Crotalus oreganus lutosus*), terrestrial gartersnake (*Thamnophis elegans*), and striped whipsnake (*Masticophis taeniatus*), which are often found near streams. Another reptile that may occur in the study area is the western skink (*Eumeces skiltonianus*), commonly found in scrub oak, sagebrush, grasslands, or juniper habitats.

Three amphibian species may occur in the study area. The Great Basin spadefoot toad (*Spea intermontana*,) ranges from dry sagebrush to spruce-fir forest habitats. The tiger salamander (*Ambystoma tigrinum*) can be found in any habitat near water. The Columbia spotted frog (*Rana luteiventris*) is a Forest Service Sensitive Species, and may occur in the study area. It prefers isolated springs and seeps with permanent water sources. This species will be discussed further in Section 3.3 – Terrestrial and Aquatic Threatened, Endangered, Sensitive, and Management Indicator Species.

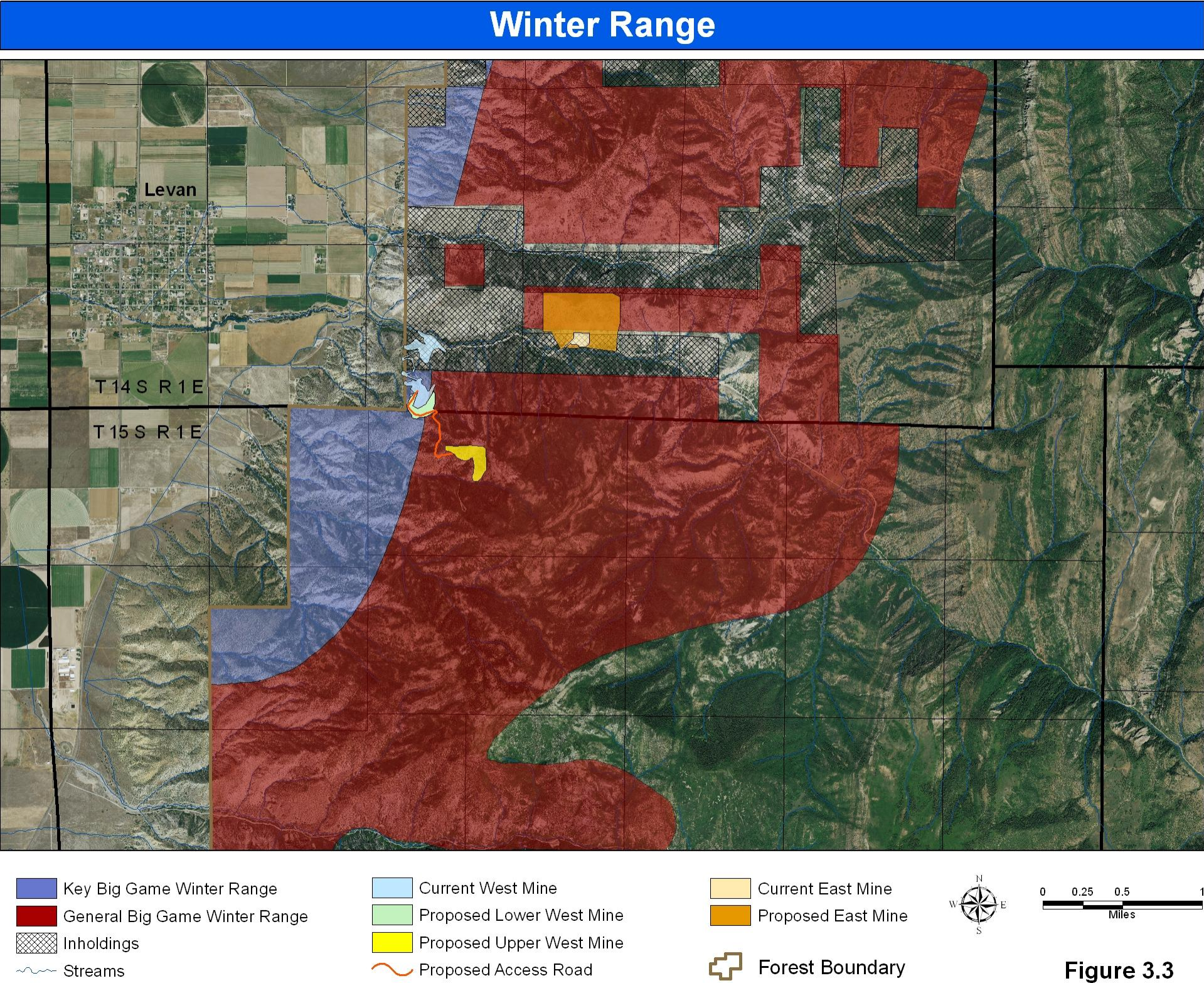


Figure 3.3



Fish

Table 3.5 lists the fish species that may inhabit Chicken Creek. None of the species listed are considered threatened, endangered, or state sensitive species, and none are listed as USFS Management Indicator Species (MIS).

Table 3.5
Fish Species that May Occur in the Study Area

Common Name	Scientific Name	Status
Brook trout	<i>Salvelinus fontinalis</i>	Common non-native game fish
Brown trout	<i>Salmo trutta</i>	Common non-native game fish
Mottled sculpin	<i>Cottus bairdii</i>	Common native
Mountain whitefish	<i>Prosopium williamsoni</i>	Common native game fish
Rainbow trout	<i>Oncorhynchus mykiss</i>	Common non-native game fish
Redside shiner	<i>Richardsonius balteatus</i>	Common native
Utah chub	<i>Gila atraria</i>	Common native

Source: UDWR, 2009

3.2.3 Impacts

3.2.3.1 General Impact

This section describes the impacts to wildlife and habitat that would be common to all project action alternatives. The continued and expanded mining operations may impact wildlife through:

- Mortality
- Habitat loss
- Habitat fragmentation
- Displacement during mining operations

Wildlife Mortality

Wildlife mortality could occur during regular operations and maintenance of the mine. It would be largely limited to terrestrial species (including birds). Operations-related mortality is generally associated with equipment crushing individual animals during earthmoving and other related activities. This type of mortality is generally most pronounced for small ground dwelling mammals, reptiles, and amphibians, since they are generally less mobile than larger mammals and birds. However, the eggs and young of birds are particularly susceptible to mortality from nest destruction during nesting season.

Habitat Loss

The loss of habitat can be temporary or permanent and short-term or long-term. Long-term loss of habitat would result from mining operations such as blasting, digging, and road construction. The mine would be reclaiming the pit areas once mining operations are complete. According to the Plan the East Mine is projected to be in operation for approximately 128 years, the Lower West Mine for 26 years, and the Upper West Mine for 26 years. This would lead to long-term habitat loss and avoidance. Many animals would avoid a certain area (approximately 0.25 mile



or one terrain feature) around the operation for the life of the mine. There are over 17,704 acres of key and general winter range for deer and elk present within the Sanpitch Mountains. Of these areas, 3 acres of key winter range habitat and 59 acres of general winter range habitat would be impacted; therefore, approximately 0.35 percent of the deer and elk range would be lost until mining and reclamation are complete.

Temporary, short-term, habitat loss includes those areas adjacent to the mine pits that are used primarily for equipment storage during mining operations. Although existing vegetation would be cleared from these areas of terrestrial habitat, it would be restored once the mining operation has moved to a new extraction area.

Habitat Fragmentation

Impacts to wildlife from habitat fragmentation are associated with the destruction or modification of habitat (habitat loss), or with the introduction of a permanent habitat disturbance that serves to divide large areas of continuous habitat (or travel corridors) into smaller disconnected remnants, such as the construction of roads. Habitat in the study area has already been fragmented due to the existing mining operations, including access roads. Expanding operations onto NFS lands would likely impact mule deer and Rocky Mountain elk the greatest because they would have to traverse around the mining areas in order to forage and migrate. It may impact smaller ground dwelling animals as well because they may also have to go around the mining operation to locate forage or living space.

Displacement

Impacts to wildlife from noise and associated visual disturbances could result in the temporary displacement of some species during mining operations, including blasting and vehicle or human activity. Timing restriction mitigation measures under Alternative Three may reduce the impacts from visual and noise disturbance as wildlife would likely stay in the area longer if the mine was not in operation, thus making the temporary disturbance to wildlife under Alternative Three from noise and visual disturbance shorter in duration.

The intensity of noise impacts during blasting and excavating activities would decrease with increased distance from the work zone. Noise can adversely affect wildlife in two ways: by inducing stress and by masking communication and other natural sounds (Legacy, 2005). Stress can result from sudden loud noises or prolonged exposure to high-level noise. The blasting activities could be loud enough and sudden enough to cause stress on wildlife. Noise could impact the ability of animals to use vocal communication and natural sounds important for mate attraction, social cohesion, predator avoidance, prey detection, navigation, and other basic behaviors (Legacy, 2005). Noise impacts would be most pronounced in areas of new mining. Because of the existing level of activity in the study area and the relatively small scale of mining activities, it is likely that most area wildlife are habituated to some level of human-related disturbance. It is anticipated that displacement from noise, including blasting and excavation activities, would be minor and long-term.



Birds and raptors are especially vulnerable to disturbance during nesting (Fyfe and Olendorff, 1976). The level of sensitivity to a disturbance depends on the species, as well as an individual's tolerance level. Generally, an individual bird will temporarily or permanently abandon a nest due to disturbance. Temporary absence from a nest could result in high nestling mortality from overheating, chilling, desiccation, or premature fledging (Fyfe and Olendorff, 1976). Most raptors return to the same nest site or territory for consecutive years, but may not return to their nesting territory the following season if it was disturbed during the previous year (Romin and Muck, 2002). Golden eagles are discussed in greater detail under Section 3.3.2.2.

3.2.3.2 Impacts of the Alternatives

The evaluation criteria used to determine the potential effects to wildlife from habitat fragmentation, associated with the destruction or modification of habitat (habitat loss) and permanent disturbance of the habitat that serves to divide large areas of habitat into smaller disconnected remnants, are the acres of disturbance and avoidance and the number of months of protection for certain species based on mitigation measures.

Alternative One (No Action Alternative) – There would be no additional impacts to wildlife species or habitat as a result of the No Action Alternative. Current impacts would continue along the same trends and there would not be any additional habitat loss or fragmentation.

Alternative Two (Proposed Action) – Alternative Two is expected to result in both short term and long term impacts to wildlife. These impacts would be temporary avoidance by big game, loss of quality habitat by fragmenting larger areas into smaller areas, and long term habitat disturbance or removal. Impacts would be long term at both the West Mine and the East Mine (52 years at the West Mine and 128 years at the East Mine). The mortality of wildlife expected during mining operations cannot be quantified; however, based on the small size of the affected area, the impact would likely be minimal. Mitigation measures under this alternative would protect big game for 3.5 months from November 15th – March 1st and would provide protection for golden eagles (see Golden Eagle Monitoring Plan, Appendix D, for specifics).

Alternative Three (Preferred Alternative) – Alternative Three is expected to have similar impacts as described in Alternative Two; however, Alternative Three would have additional mitigation measures employed that would provide additional protection for big game and raptors. The seasonal closure measures that would be applied for big game winter range would protect big game for 4.5 months (December 1st – April 15th). These dates provide more protection in the spring which is crucial for big game in years with above average snowfall and a longer spring melt. Seasonal raptor buffers would also be applied which would protect raptor species other than just golden eagles.

3.2.4 Mitigation Measures Not Included in The Plan of Operations

The following additional mitigation measure will be implemented to minimize impacts to wildlife under Alternative Three:



- Raptor nests, other than golden eagles, found within the area of mining activity would be protected by spatial buffers for active nests in accordance with the U.S. Fish and Wildlife Service Utah Raptor Guidelines (USDI, U.S. Fish and Wildlife Service 2002), if it is determined by a qualified U.S. Forest Service Biologist that mining activities could cause nest abandonment or failure. Seasonal buffers may be recommended from various mining activities (blasting, excavation, crushing, hauling, etc...) and can vary depending on the species, from 0 - 9 months.
- Mule deer and Rocky Mountain elk occur in the project area and timing restrictions will be placed on mining operations during the winter months, i.e., December 1 – April 15, of each year to prevent impacts to key winter foraging habitat.

3.3 TERRESTRIAL AND AQUATIC THREATENED, ENDANGERED, SENSITIVE, AND MANAGEMENT INDICATOR SPECIES

3.3.1 Introduction

This section of the EIS is a description of the Threatened and Endangered (T&E), Sensitive, and Management Indicator Species (MIS) that may be present in the study area, and the impacts to these species from the proposed action.

Special status species are those identified by State and Federal agencies that warrant special consideration during planning and management activities. The U.S. Fish and Wildlife Service (USFWS) maintain a list of species that receive protection under the Endangered Species Act (ESA) as either threatened or endangered. An “endangered” species is one that is in danger of extinction throughout all or a significant portion of its range. A “threatened” species is one that is likely to become endangered in the foreseeable future. The USFWS also maintains a list of plant and animals native to the United States that are candidates or proposed for possible addition to the federal list.

In addition to T&E species, the Regional Forester identifies Sensitive species as those for which population viability is a concern, as evidenced by significant current and predicted downward trends in population numbers, density, and/or habitat capability that would reduce a species’ existing distribution. Forest Service policy directs that viable populations of all native and desired nonnative wildlife, fish, and plant species be maintained on National Forest System lands throughout their geographic range (FSM 2670.22). Sensitive species must receive special management emphasis to ensure their viability and to preclude trends toward endangerment that could result in the need for Federal listing (FSM 2672.1). Management Indicator Species (MIS) are species that the Forest uses to evaluate and monitor management practices. These species serve as ecological indicators of the effects of management actions on communities.



3.3.2 Affected Environment

3.3.2.1 Description of Threatened and Endangered Species

Table 3.6 shows all plant and animal species designated by the U.S. Fish and Wildlife Service (USFWS) as threatened, endangered, or candidate that could occur within Juab County, Utah (USFWS, 2012). The table also describes habitats occupied by these species. There are no species proposed for listing under the ESA in Juab County. Threatened, endangered, or candidate species that do not occur, or do not have available habitat within or near the project area are identified in **Table 3.6**. However, they are not considered further in this analysis as the project would have no effect on these species.

Table 3.6
ESA Listed Species Potentially Occurring in Juab County, Utah, Their Potential Occurrence in the Project Area, and Consideration in this EIS

Common Name (<i>Scientific Name</i>)	Species Status	Habitat Description, Species Occurrence and Consideration in this EIS
Ute Ladies' - tresses (<i>Spiranthes diluvialis</i>)	Threatened	Considered. <i>Spiranthes diluvialis</i> is a plant known to occur in the northern half of the state (i.e., in the Uinta Basin and along the Green River, Daggett, Duchesne, and Uintah counties; through Utah Valley and along Diamond Fork and Spanish Fork, Utah County; at Willow Spring, Juab County; on the Freemont River, Wayne County; and along Deer Creek, Garfield County). In Utah, it ranges in elevation from 4,300 to 7,000 feet (UDNR, 2012). Habitat is moist to wet meadows, stabilized stream sides to active floodplains, and manmade sites such as abandoned borrow and peat mining pits (Franklin, 2005) and (UDNR, 2012).
Greater Sage Grouse (<i>Centrocercus urophasianus</i>)	Candidate	Not Considered. Sage grouse are generally found where there are large tracts of sagebrush habitat with a diverse and substantial understory of native grasses and forbs or in areas where there is a mosaic of sagebrush, grasslands, and aspen. Wet meadows, springs, seeps, or other green areas within sagebrush shrublands are generally needed for the early brood-rearing period (Connelly et al., 2004). This area is not considered suitable brood rearing or



		winter habitat for sage grouse by UDWR (UDWR, 2011).
Utah Prairie Dog (<i>Cynomys parvidens</i>)	Threatened	Not Considered. Utah prairie dogs are true hibernators, ceasing most surface activity during harsh winter months. The species breeds in the spring, mid-March through early April and has only one litter per year. Prairie dogs are predominantly herbivores, with grasses being the staple of their diet throughout the year and forbs during the spring and fall (UDNR, 2012), (USFWS, 2007). There is no suitable habitat near the project area.
Western Yellow-billed Cuckoo (<i>Coccyzus americanus</i>)	Candidate	Not Considered. In Utah, nests this bird nests at elevations of 2,500 to 6,000 feet. Requires large tracts (100 to 200 acres) of contiguous riparian nesting habitat (Parrish et al., 2002). Riparian habitat within the project area is not suitable for nesting due to its small size. In addition, the elevation of the project area is above that typically used by the species.
Least Chub (<i>Iotichthys phlegethontis</i>)	Candidate	Not Considered. Historically, this species was widely distributed in the Bonneville Basin, including streams near Salt Lake City, ponds and swamps around Great Salt Lake, Utah Lake, Beaver River, Parowan Creek, Clear Creek, Provo River, Snake Valley, and elsewhere. Now the species occurs naturally in four general areas: Snake Valley, Mona Springs, Mills Valley, and Clear Lake (Sevier subbasin) (NatureServe, 2012). This species is now found in alkaline spring habitats, typically found in moderate-dense submergent and emergent vegetation, at depths of 10-90 centimeters, over bottoms of clay, muck, mud, and peat (NatureServe, 2012). There are no streams in the project area where the least chub occurs.

Ute Ladies'-tresses

The USFWS listed Ute ladies' tresses in 1992 as threatened under the ESA of 1973, as amended. Populations of the Ute ladies' tresses occur in three general areas of the interior western U.S.: near the base of the eastern slopes of the Rocky Mountains in southeast Wyoming and north-



central and central Colorado, in the upper Colorado River Basin, and along the Wasatch Front in north-central and western Utah and extreme eastern Nevada and in the Uinta Basin. Two extant populations are also known in central Washington.

Habitat for Ute ladies' tresses has been described as along streams (associated alluvial banks, point bars, floodplains, or ox-bows), bogs, and open seepage areas in cottonwood, tamarisk, willow, and pinyon-juniper communities, at elevations ranging from approximately 4,300 to 7,000 feet. This species has also been found in or along seasonally flooded river terraces, sub-irrigated or spring-fed abandoned stream channels and valleys, lakeshores, irrigation canals, berms, levees, irrigated meadows, excavated gravel pits, roadside borrow pits, reservoirs, and other human-modified wetlands (Fertig et al., 2005).

The species exists on the Uinta National Forest, near the Wasatch Front approximately 40 miles to the north of the Sanpitch Mountains. This species is not known to occur on the Forest; however, given the presence of a perennial stream (Chicken Creek) in the study area and since site-specific surveys for the species have not been conducted, the presence of Ute Ladies'-tresses cannot be discounted. Potential habitat for this species does not occur on NFS lands within the project area, as the only drainages occurring on NFS lands are intermittent, are dry during the summer except after a large rain event, and are therefore not expected to contain wetland habitat. Habitat may be more suitable along the perennial Chicken Creek channel which occurs on private land within the study area.

3.3.2.2 Description of Sensitive Species and Management Indicator Species

Table 3.7 lists the plant, wildlife, and fish species on the Intermountain Regional Forester's list of sensitive species (USFS, 2011) that could occur on the San Pitch Division of the Manti-La Sal National Forest and describes the habitat requirements for these species. Species that do not occur or do not have suitable habitat in or near the project area are also identified in **Table 3.8**; however, they are not considered further in this EIS. None of the alternatives would have an impact on those species.

Table 3.7
Sensitive Plant, Wildlife, and Fish Species that Could Occur on the San Pitch Division of the Manti-La Sal National Forest

Common Name (Scientific Name)	Habitat Description, Species Occurrence, and Consideration in the EIS
Terrestrial Wildlife Species	
Bald Eagle (<i>Haliaeetus leucoccephalus</i>)	Considered. Bald eagles utilize rivers and lakes during the breeding and wintering seasons. Snags and trees near open bodies of water are used as winter daytime roost sites. Bald eagles are primarily winter residents in Utah and may occur near the project incidentally during winter foraging and spring and fall migration.
Bighorn Sheep (<i>Ovis Canadensis</i>) – Includes	Not Considered. <i>Ovis Canadensis nelsoni</i> occurs in open rocky areas of desert mountain ranges in the



Common Name (Scientific Name)	Habitat Description, Species Occurrence, and Consideration in the EIS
Rocky Mountain bighorn (O. c. canadensis), California bighorn (O. c. californiana), and desert bighorn sheep (O. c. nelsoni).	<p>southwestern United States and northern Mexico. A native Utah species, the desert bighorn sheep can be found in the southern (especially southeastern) area of the state (UDNR, 2012).</p> <p><u>Ovis canadensis canadensis</u> is native to rugged mountainous areas of western North America. The species has been eliminated from much of its former range due to over-hunting, habitat alterations, and diseases introduced by domestic livestock (UDNR, 2012). In Utah, Rocky Mountain bighorn sheep can now be found in a number of mountain ranges. Rocky Mountain bighorn sheep prefer steep rocky slopes, and may migrate from higher elevations to lower valleys in the winter.</p> <p><u>Ovis canadensis californiana</u> is a race of the bighorn sheep, <i>Ovis canadensis</i>. Although it is not certain that the California bighorn sheep naturally occurred in Utah in historic times, there is some evidence to suggest that it was once native to Utah. In recent times, a population of California bighorn sheep has been established by the Utah Division of Wildlife Resources and the Utah Division of Parks and Recreation on Antelope Island, in the Great Salt Lake. Neither of the three species is located in or near the project area.</p>
Flammulated Owl (<i>Otis flammeollus</i>)	Not Considered. Flammulated owls occur in mixed pine forests with a ponderosa pine or Douglas-fir component and have also been found in mixed conifer and aspen forests. There is no suitable habitat for these owls found within the project area. Suitable habitat is over 0.5 miles away.
Greater Sage Grouse (<i>Centrocercus urophasianus</i>)	Not Considered. Discussed in Table 3.6 , above.
Northern Goshawk (<i>Accipiter gentilis</i>)	Not Considered. The northern goshawk is a forest habitat generalist that uses a wide variety of forest ages, structural conditions, and successional stages. Suitable habitat is over 0.5 miles from the project area.
Peregrine Falcon (<i>Falco peregrinus</i>)	Considered. Peregrine falcons can be found in a wide variety of habitats in the Intermountain West. They prefer to nest on high cliffs in mountainous areas or deep canyons. The large foraging area utilized by this



Common Name (Scientific Name)	Habitat Description, Species Occurrence, and Consideration in the EIS
	falcon could result in incidental occurrences in the project site. Rock outcrops on or near the project site could provide suitable nest sites.
Spotted Bat (<i>Euderma maculatum</i>)	Considered. In Utah, the spotted bat is likely found throughout the state. It uses a variety of vegetation types including riparian, desert shrub, spruce/fir, ponderosa pine, montane forests and meadows. Spotted bats roost alone in rock crevices high up on steep cliff faces (Oliver, 2000). Rock outcrops on the project site provide potential roost habitats for the spotted bat. The Chicken Creek riparian area provides potential foraging habitat.
Three-toed Woodpecker (<i>Picoides tridactylus</i>)	Not Considered. This species occurs uncommonly in boreal forests of Utah and is dependent on recent burns and spruce bark beetle infestation for foraging. It is found out high elevations in coniferous forests, usually nests above 8,000 feet in Utah (Parrish et al., 2002). The project area does not contain suitable habitat and is below typical nesting elevations.
Townsend's Big-eared Bat (<i>Plecotus townsendii pallescens</i>)	Considered. Occurs throughout Utah and utilizes desert shrub, pinyon-juniper, pinyon-juniper-sagebrush, mountain brush, mixed forest, and ponderosa pine forest. Mines and caves are used as day and night roosts (Oliver, 2000). The project site contains suitable foraging habitat in pinyon-juniper communities. Potential roosting habitat can be found in rock outcrops on or near the site.
Western Yellow-billed Cuckoo (<i>Coccyzus americanus</i>)	Not Considered. This species is discussed in Table 3.6 above.
Aquatic Wildlife Species	
Bonneville Cutthroat Trout (<i>Oncorhynchus clarki Utah</i>)	Not Considered. Can be found in a number of habitat types, ranging from high-elevation streams with coniferous and deciduous riparian trees to low-elevation streams in sage-steppe grasslands containing herbaceous riparian zones to lakes. Occurs primarily in small headwater streams. Requires a functional riparian zone providing structure, cover, shade, and bank stability (NatureServe 2012), (UDNR, 2012). Surveys conducted by UDWR and Forest Service Biologist confirmed that Bonneville cutthroat trout are not present in the Chicken Creek watershed.
Colorado River Cutthroat Trout	Not Considered. Colorado River cutthroat trout are found in the Upper Colorado River drainage in Utah



Common Name (Scientific Name)	Habitat Description, Species Occurrence, and Consideration in the EIS
(<i>Oncorhynchus clarki pleuriticus</i>)	(NatureServe, 2012). The project area is not part of the Colorado River drainage.
Columbia River Spotted Frog (<i>Rana luteiventris</i>)	Considered. Columbia spotted frogs typically inhabit a variety of habitat types including: cold water ponds, streams, lakes, and springs adjacent to mixed coniferous and subalpine forest, grassland and brush land (CWCS, 2005). Columbia spotted frogs have been found in the Juab Valley. The project site includes a perennial stream, Chicken Creek, which could provide potential habitat.
Southern Leatherside Chub (<i>Lepidomeda aliciae</i>)	Not Considered. Southern leatherside chubs inhabit desert streams of the Bonneville Basin. Southern leatherside chubs require flowing water and do not persist in lakes or reservoirs. No populations of southern leatherside chubs are present near the project area.
Western Boreal Toad (<i>Bufo boreas boreas</i>)	Not Considered. The western toad inhabits western Canada and much of the western (especially northwestern) United States. It occurs throughout most of Utah, and can be found in a variety of habitats, including slow moving streams, wetlands, desert spring, ponds, lakes, meadows, and woodlands (UDNR, 2012). There is no suitable habitat within the proposed project area.

Table 3.8 is a listing of Management Indicator Species that could occur in the project area on the San Pitch Division of the Forest. MIS species that do not occur or do not have suitable habitat in or near the project area are also identified in **Table 3.8**; however, they are not considered further in this analysis.

Table 3.8
Management Indicator Species that Potentially Occur Within the Project Area on the San Pitch Division of the Manti-La Sal National Forest

Common Name (Scientific name)	Species/Habitat Associations	Species Occurrence and Consideration in the EIS
Rocky Mountain Elk (<i>Cervus canadensis nelsonii</i>)	Elk are common in most mountainous regions of Utah. They can be found in mountain meadows and forests during the summer and in foothills and valleys during the winter (UCDC, 2008).	Considered. There is seasonally important range present for elk within the study area. The Forest identifies the project area as “Key” and “General” winter range under the Forest Plan. Refer to Figure 3.3 for the



Common Name (<i>Scientific name</i>)	Species/Habitat Associations	Species Occurrence and Consideration in the EIS
		location of these critical habitat areas.
Mule Deer (<i>Odocoileus hemionus</i>)	Mule deer are adaptable to a wide variety of habitats throughout their range. Deer eat a wide variety of plants including browse, forbs and grasses. They rely heavily on shrubs for winter forage (UDWR, 2003).	Considered. There is seasonally important range present for mule deer within the study area. The Forest identifies the project area as “Key” and “General” winter range under the Forest Plan. Refer to Figure 3.3 for the location of these critical habitat areas.
Northern Goshawk (<i>Accipiter gentilis</i>)	The northern goshawk occurs as a permanent resident throughout Utah, but is not common in the state. This species prefers mature mountain forests and riparian zone habitats (UDNR, 2011).	Not Considered. No suitable habitat is located within the project area. The nearest goshawk habitat is over 0.5 miles away.
Golden Eagle (<i>Aquila chrysaetos</i>)	Golden eagles breed in shrub land, grassland, farmland, tundra, and open forests. They are most common in shrubby habitats containing cliffs for nest sites (Farmer <i>et al.</i> , 2007).	Considered. There are golden eagle nests in the project area vicinity. Golden eagles may forage within the Project Area.
Macro-invertebrates (<i>aquatic Insects</i>)	Macroinvertebrates are ecological indicator species in aquatic habitats. Habitat requirements for aquatic macroinvertebrates vary by species and are often species-specific.	Considered. There is a perennial stream (Chicken Creek) outside the mine operations area on private land.

Bald Eagle

The USFWS published the final rule to remove the bald eagle from the list of threatened and endangered species under the ESA. The final rule was published in the federal register on July 9, 2007 (USFWS, 2007a). The rule became effective on August 8, 2007. Bald eagles are still protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Since the delisting of the bald eagle, the Forest Service has adopted the bald eagle as a Region 4 sensitive species.

Breeding range for the bald eagle includes Alaska, Canada, the coastal United States, and portions of the northern United States. Nests are almost always in tall trees and commonly near bodies of water where waterfowl and fish are abundant. Nests are very large, usually 5 to 6 feet and up to 12 feet in diameter and constructed of sticks (UDNR, 2011).



In Utah, the bald eagle is primarily a winter resident and starts arriving in November. They are most abundant in January and February, and begin migrating north in March. Bald Eagles generally utilize cottonwoods and snags near open bodies of water as winter roosting sites, and feed opportunistically on live or dead fish, waterfowl, and mammals (Beck, 1980).

As of 2009, eleven bald eagle pairs are known to nest in widely scattered locations throughout Utah (UDWR, 2009a). There are no nesting pairs in the vicinity of the Sunroc Gypsum Mine or the San Pitch Division of the Manti-La Sal National Forest. Bald eagles are not known to nest within the Project Area. Eagles do over-winter in the Juab Valley and utilize the valley during migration periods (UDWR, 2008). Bald eagles may enter the vicinity of the project area during spring and fall migration, and may utilize large trees and foraging habitat along the Chicken Creek Reservoir, about 7 miles to the southwest of the mine, and the Chicken Creek drainage while over-wintering.

Peregrine Falcon

Peregrine falcons are found in a wide variety of habitats in the Intermountain West. They prefer to nest on cliffs (generally at least 200 feet in height), usually in mountainous areas or in river canyons and gorges, although aeries (nests) are also known in metropolitan areas on structures such as towers and high-rise buildings (Bond et al., 1984). Peregrine falcons prey almost exclusively on other species of birds, especially doves, pigeons, shorebirds, waterfowl, and passerines. They may forage up to 18 miles away from their aeries, although most hunting occurs within a 10-mile radius of the nest, and often over 80 percent of the foraging occurs within 1 mile of the aerie (Ehrlich et al., 1988). Peregrines overwinter in a wide range of habitats, but in the Intermountain West they appear to concentrate along large rivers. Some birds may remain on their breeding territories throughout the year if there is an adequate food supply (Spahr et al. 1991). Aeries have been reported at elevations above 10,500 feet, although nesting above 8,000 feet is extremely rare (Bond et al., 1984).

The peregrine falcon currently breeds on the Colorado Plateau and to a lesser extent along the Wasatch Front. There are about 180 breeding pairs in Utah (Bosworth, 2003). Cliffs in and adjacent to the Project Area provide potentially suitable nesting habitat for peregrine falcons, but no nest sites are known. The closest known nest to the mine site is 16 miles or more to the south, and two sightings of peregrine falcons have been recorded near Chicken Creek Reservoir, approximately 7 miles southwest of Chicken Creek (UDWR, 2008). Therefore, it is possible that peregrine falcons forage in the proximity of the Project Area.

Spotted Bat

Spotted bats are found in relatively remote, undisturbed areas in a variety of habitats, including open ponderosa pine, desert shrub, pinyon-juniper, and open pasture and hay fields, and have been recorded at elevations as high as 9,500 feet. They roost alone in rock crevices on steep cliff faces and have been found hibernating in caves (Oliver, 2000). Spotted bats are territorial and use echolocation to avoid each other while foraging. Their diet consists primarily of moths caught in flight after dark in open pine stands and over marshes (Wai-Ping and Fenton, 1989). As is common with many bats, spotted bats may forage a considerable distance (up to 6 miles) from



roost sites (Toone, 1994). Information on seasonal movements is scarce, though spotted bats are thought to migrate south to hibernate.

Spotted bats are considered rare, but can be expected to be found throughout Utah. Because of their tendency to forage high above the ground and thus not to be readily captured in mist nests, it may be more common in Utah than records suggest (Oliver, 2000).

There are no records of spotted bats in the project area, but this area has not been surveyed. Spotted bats could potentially use the rock outcrops at or near the project area as roosting sites and the pinyon-juniper and grassland communities and riparian area along Chicken Creek for foraging.

Townsend's Big Eared Bat

Townsend's big-eared bats use juniper/pine forests, shrub/steppe grasslands, deciduous forests, and mixed coniferous forests from sea level to 10,000 feet. During winter they roost singly or in small clusters in caves, mine shafts, rocky outcrops, or occasionally in old buildings (Oliver, 2000). They remain at these sites, called hibernacula, from October to February. They do not migrate, but will move to different roost locations within hibernacula during winter. In summer, females roost with their young in nursery roosts. Males and non-breeding females roost alone. Townsend's big-eared bats are nocturnal insectivores and prey primarily on moths along forest edges.

The availability of suitable roosting habitat for maternity colonies and hibernacula is the limiting factor for Townsend's big-eared bats. These bats are sensitive to human disturbance, and have been repeatedly observed to abandon their roosts when activities occur within the roost sites (Oliver, 2000). The main threats to roosts are abandoned mine reclamation, recreational caving, renewed mining in historic districts, and natural subsidence of caves and mines.

There are no records of Townsend's big-eared bats in the study area, but this area has not been surveyed. The pinyon-juniper and grassland communities and perennial stream corridor adjacent to the project area could provide foraging habitat for Townsend's big-eared bats, and several rock outcrops could provide potential roosting habitat. UDWR considers the western foothills of the San Pitch Mountains in the Juab Valley to be substantial to high value habitat based on the Utah Gap Analysis for predicted habitat (UDNR, 2012).

Columbia River Spotted Frog

Columbia spotted frogs are found in areas where permanent, quiet water is present, such as marshy edges of ponds or lakes, algae-grown overflow pools of streams, emergent wetlands, and near springs. Emergent and submergent vegetation are considered important habitat features. Following the spring breeding season they may move considerable distances from water, often frequenting mixed-conifer and subalpine forests, grasslands, and brushlands of sage and rabbitbrush if puddles, seeps or other water is available. Adult spotted frogs feed on invertebrates, generally within 0.5 meters of shore on dry days. During and immediately after rains, they may move away from permanent water to feed in wet vegetation or ephemeral



(temporary) puddles (Licht, 1986). Spotted frogs hibernate during winter and emerge to breed when open water becomes available, generally during spring thaw.

Columbia spotted frogs are found in the northern part of the Juab Valley in several locations (Bosworth, 2003). Columbia spotted frog populations in Utah are separated into three Geographic Management Units (GMU): the Wasatch Front GMU, Sevier River GMU, and West Desert GMU. The Sevier River GMU applies to the Project Area. The San Pitch River subunit of the Sevier River GMU contains the Fairview Columbia spotted frog population, which includes 11 breeding sites that have been monitored annually since 1992 (UDWR, 2006). The UDWR considers a few sites within the Juab Valley near the Chicken Creek Reservoir as limited value habitat based on the Utah Gap Analysis for predicted habitat (UDNR, 2012). Wetland habitat and springs associated with Chicken Creek could potentially provide suitable breeding habitat for the Columbia spotted frog; however, this habitat is uncommon in the study area.

Rocky Mountain Elk

Elk are widespread and abundant throughout Utah and prefer mountainous country with mixed open, grassy meadows, marshy meadows, river flats, and aspen parkland, as well as coniferous forests, brushy clearcuts, forest edges, and shrub steppe. Some populations live year-round in sagebrush desert. Elk use grass-shrublands for feeding and tall shrubs or pole timber for resting in the spring; they feed in clearcuts and shrub fields and rest in pole timber in the summer; and remain in mesic (moderate moisture) pole timber in the autumn (Streubel, 2000). Elk habitat varies greatly according to location. They are primarily a grazing species, relying on grasses for most of the year, but they also consume forbs in summer, and may browse on woody plants where grass availability is low, especially during winter months.

In Utah, and throughout the northern Rockies, herds move to lower elevations in winter to feed. Winter range is typically composed of mixed shrub, pinyon-juniper, and sagebrush habitats. Individuals exhibit a high fidelity to their home range, but may abandon it if they are excessively disturbed (Streubel, 2000).

Mule Deer

Mule deer are widespread and abundant throughout the state, occupying nearly all habitats in Utah from dry, open country to dense forests. They prefer rocky, dense brush areas, open meadows, open pine forests, and wildfire burned areas (Brown, 1992). Mule deer also can be found in coniferous forests, shrub steppe, chaparral, and grasslands with shrubs. Mule deer are often associated with early successional vegetation or vegetation resulting from disturbance, especially near agricultural lands.

Mule deer migrate from high mountainous country to lower valleys and foothills during late fall to avoid heavy snow. Big game winter habitat in western North America is defined as south facing areas on mild to medium slopes (Thomas, 1979; Hoover and Willis, 1987). Lower elevation habitat becomes very important during severe winters when deer try to avoid deeper snow, which can hamper their abilities to find forage and can quickly deplete their necessary fat reserves.



During winter months, mule deer browse on a wide variety of woody plants when snow covers many grasses and forbs. Common browse plants include mountain mahogany (*Cercocarpus montanus*), bitterbrush (*Purshia tridentate*), sagebrush, aspen (*Populus tremuloides*), dogwood (*Cornus spp.*), juniper (*Juniperus spp.*) and Douglas-fir (*Pseudotsuga menziesii*). They graze on various grasses and forbs heavily during spring, summer and fall, and to a lesser extent, on woody browse. They also forage in irrigated fields during winter and spring.

Golden Eagle

Golden eagles are typically found in open country, including shrublands, grasslands, canyons, and desert plains, as well as open coniferous forests in mountainous regions. Elevated nest sites, typically on cliff faces near their hunting grounds, are the preferred breeding habitat. In the absence of suitable cliffs and rock outcrops, they have been known to nest in trees. Golden eagles feed mainly on small mammals, especially rabbits, marmots, and ground squirrels, but also eat insects, snakes, birds, juvenile ungulates, and carrion. Golden eagles typically mate for life. The breeding season generally begins in mid-January and continues through mid-September, though it can vary according to geographic region.

Long-term trends from raptor migration counts indicate that populations of the golden eagle have declined in much of the western United States since the mid 1980's. In contrast, a non-significant increase was recorded from 1987 to 2004 in Utah (Farmer et al., 2007). The Breeding Bird Survey (BBS) reports a stable population in Utah since the mid 1980's (Sauer et al., 2011).

Eight known golden eagle nests occur in the vicinity of the project area. Four nests occur in the Chicken Creek Drainage, three of which are within 0.5 mile of the current mining operations. All four nests are within 0.5 mile from the proposed mine expansion. Four other nests are located within the Pigeon Creek drainage to the north, with one nest falling within 0.5 mile of current mining operations. Three of the four nests are within 0.5 mile of the proposed mine expansion (USDA, Forest Service 2012). The eight nests were monitored in the spring of 2012. The Pigeon Creek 1 nest was active and produced one chick which successfully fledged. This nest is approximately 0.33 miles from the proposed activities at the East Mine, although it is in the opposite drainage with no direct line of site with the mine. The Pigeon Creek 3 nest was a tended nest within an active nest territory. No nests within the Chicken Creek drainage were active. Suitable nesting and foraging habitat for golden eagles is present in the project area.

Macro-Invertebrates

Macro-invertebrates are benthic organisms including aquatic insects, i.e., mayflies, stoneflies, caddis flies, daphnia, cyclops and diptera [two-winged flies], mollusks and worms. Macro-invertebrates are ecological indicators of the condition of aquatic habitats and the ability of these habitats to support fisheries. These species are affected by several environmental factors including water temperature, water quality, flow, and substrate type. Changes in aquatic habitats caused by management activities can lead to changes in the species composition and abundance of macro-invertebrates.



In general, higher abundance and diversity of macro-invertebrates are associated with cool water temperatures, substantial perennial flows, and diverse streambed substrate. Lower abundance and diversity are associated with ephemeral streams. In general, ephemeral streams present high water temperature, low flow, and streambeds with large amounts of fine sediment. Therefore, macro-invertebrate diversity and abundance within the Project Area vicinity is expected to be higher on perennial streams (Chicken Creek) than in the intermittent drainages (tributaries to Chicken Creek).

The Forest Plan was amended in 2006 to update the protocols used to collect macro-invertebrate data and to change the method used to analyze the data. The 2006 amendment did not alter the language regarding macro-invertebrate monitoring as an optional technique for selected projects. The Forest will continue monitoring aquatic habitat using macro-invertebrate sampling, but change the type of appraisal method used. The methodology is similar to that being used by the Utah Division of Water Quality (UDWQ) for macro-invertebrate monitoring. The State program has selected relatively unimpaired representative streams as reference sites for different stream types. Monitoring will continue at baseline stations to characterize Forest-wide conditions.

There is a baseline macro-invertebrate monitoring site on Chicken Creek near the project area. Samples were collected in 2009; the results were analyzed by the UDWQ and the O/E percentages determined. O is the number of species predicted and E is the number of taxa present. Those results are compared to standards within the Forest Plan. Chicken Creek is meeting Forest Plan standards.

3.3.3 Impacts

The evaluation criteria used to determine the potential effects of the proposed project on threatened, endangered, and sensitive species are the acres of habitat that would be impacted or avoided by each species due to mining activities and the number of months per year the impact would continue. Refer to section 5.0 of the BE/BA for the determination of effects to threatened, endangered, and sensitive species. In cases where species are associated with riparian habitats, notably stream banks and floodplains, the impact assessment is qualitative, as riparian habitats are not specified as a land cover type within the USFS GIS coverage (USFS, 2005). Riparian habitats are contained within the cottonwood/brush land cover type, but also occur adjacent to Chicken Creek in the oakbrush and mountain mahogany cover types. Refer to **Table 3.3** for a listing of the land cover types by ownership and the area that would be disturbed by the proposed action.

Under Alternative One there would not be any additional impacts to special status plants or wildlife associated with the No Action Alternative. Mining would continue in the Lower West Mine and East Mine until the currently permitted reserves at those sites were depleted. Mining would not advance further into NFS lands; therefore, no ground disturbing activities would occur outside the currently permitted area. Under Alternative One, mining operations on NFS lands are projected to cease in 2012. Wildlife would likely move back into the areas that are currently being mined because noise from human activity would no longer exist, and mined areas would start to be reclaimed and could provide habitat for wildlife.



Under Alternatives Two and Three the impacts would be similar. The difference in the alternatives would be the additional mitigation requirements for raptors and big game (elk and deer) associated with Alternative Three. These mitigation measures would likely increase the time that raptors, big game, and other wildlife spend near the project area. These measures would also reduce stress from mining activity related noise and visual impacts, and could increase wildlife productivity near the project area. Some mitigation measures are discussed in Section 3.3.4, and additional mitigation measures are discussed in Section 3.4.4. Each of the species listed in **Tables 3.6, 3.7, and 3.8** as **Considered** in this analysis are discussed separately in the following sections.

3.3.3.1 Ute Ladies'-Tresses

No known populations of Ute ladies'-tresses would be directly or indirectly impacted in the study area under Alternatives One, Two, and Three as this species has not been documented within the Forest. The proposed road accessing the Upper Chicken Creek West Site would cross an intermittent drainage; however, since this portion of the drainage only contains water seasonally during runoff, and based on the dryness of other drainages in the area, this would not be considered suitable habitat for Ute ladies'-tresses. No ground disturbance would occur in the riparian areas associated with Chicken Creek, where potentially suitable habitat for this orchid occurs; therefore, no effects to Ute ladies'-tresses are anticipated under Alternatives Two and Three.

3.3.3.2 Bald Eagle

Mining activities and associated noise from equipment operation and blasting could disrupt behavior of bald eagles foraging and perching in the vicinity of the mine. The magnitude of behavior modification would vary depending on the distance of the disturbance from the eagles and the intensity and duration of the disturbance. Responses could vary from temporary startle responses (flush) and short avoidance flights, causing them to avoid commonly used perches or forage sites, to longer-term avoidance of the area. Impacts would be greatest if the eagles were foraging in the immediate vicinity of Chicken Creek where many of the mining activities would be above the eagles, potentially increasing the perceived threat; however, some habituation by eagles to activities (especially those occurring continuously or predictably) could occur. There would be no impact on nesting eagles under Alternatives One, Two and Three since they are not known to nest near the mine site.

3.3.3.3 Peregrine Falcon

Impacts to the peregrine falcon could occur from the direct disturbance or removal of suitable habitat and indirect impacts associated from the noise and traffic of mining activities resulting in avoidance. These impacts would be measured by the acres of suitable habitat removed or disturbed and the number of months of protection.

- **Alternative One** – There would be no further impacts to suitable habitat under Alternative One other than those resulting from the currently permitted mining operations. Sunroc would not expand its mining operations on NFS lands and would only



continue its operations in the previously approved mining areas. With the current approved operations 11.3 acres of suitable habitat on NFS lands have already been disturbed and 9 acres on private lands.

- **Alternative Two** – The impacts to peregrine falcons under Alternative Two would be the removal or disturbance of 66 acres of suitable habitat on the Forest and 28.1 acres on private land. There is approximately 76,192 acres of suitable habitat within the San Pitch Mountains. These acres would not be considered significant based on only 0.1 percent of the suitable habitat within the San Pitch Mountains being impacted. Under Alternative Two there would be no months of protection if an active nest is found that could be negatively impacted by the mining activities.
- **Alternative Three** – The impacts to suitable habitat under Alternative Three would be the same as Alternative Two; however, if an active nest is found that could be negatively impacted by mining activities, the raptor mitigation measures would be applied which would provide 7 months of protection. Mining activities include noise from equipment operation and blasting.

Mining activities may impact the prey base of peregrine falcons, through the destruction of nesting and foraging habitats of prey. With the availability of suitable habitat adjacent to the project and the distance from known peregrine falcon aeries, impacts would be minimal and would most likely impact individuals.

3.3.3.4 Spotted Bat

Impacts to spotted bats could occur from the direct removal or disturbance of suitable habitat.

- **Alternative One** – There would be no further impacts to suitable habitat under Alternative One other than those resulting from the currently permitted mining operations. Sunroc would not expand its mining operations on NFS lands and would only continue its operations in the previously approved mining areas. With the current approved operations 11.3 acres of suitable habitat on NFS lands have already been disturbed and 9 acres on private lands.
- **Alternative Two** – The impacts to spotted bats under Alternative Two would be the removal or disturbance of 13 acres of suitable roosting habitat on the Forest and 17 acres on private land, categorized as barren rock outcrop or ledge. This is 0.8 percent of the suitable habitat available within the San Pitch Mountains. No spotted bat surveys have been conducted so analysis is based on the assumption that spotted bats use the area. Spotted bats potentially inhabiting rock outcrops within the mine boundaries would be displaced, injured, or killed during the proposed expansion of the mine. Adjacent roosting habitat could be lost because of mining activities (such as blasting and vibration from heavy equipment) that could disturb or destroy cracks and crevices in cliffs and rock formations. Impacts would most likely be to individual bats. The large acreage of



suitable habitat adjacent to the mining area would minimize impacts to overall populations.

- **Alternative Three** – The impacts to suitable spotted bat roosting and foraging habitat would be the same as Alternative Two.

3.3.3.5 Townsend's Big Eared Bat

Impacts to Townsend's big-eared bats could occur from the direct removal or disturbance of suitable habitat.

- **Alternative One** – The impacts to Townsend's big-eared bats would be similar to the impacts to spotted bats. There would be no further impacts to suitable habitat under Alternative One other than those resulting from the currently permitted mining operations. Sunroc would not expand its mining operations on NFS lands and would only continue its operations in the previously approved mining areas. With the current approved operations 11.3 acres of suitable habitat on NFS lands have already been disturbed and 9 acres on private lands.
- **Alternative Two** – The impacts to Townsend's big-eared bats under Alternative Two would be the removal or disturbance of 13 acres of suitable roosting habitat on the Forest and 17 acres on private land, categorized as barren rock outcrop or ledge. This is 0.8 percent of the suitable habitat available within the San Pitch Mountains. No Townsend's big-eared bat surveys have been conducted so analysis is based on the assumption that spotted bats use the area. There is a historic record of Townsend's big-eared bats in an old mine in Pete's Canyon, west of Wales which is approximately 12 miles from the mine activities. No known underground mines or caves have been documented in the close vicinity of the Chicken Creek Gypsum Mine.
- **Alternative Three** – The impacts to suitable Townsend's big-eared bat roosting and foraging habitat would be the same as Alternative Two.

3.3.3.6 Columbia River Spotted Frog

Potential breeding habitat for spotted frogs is generally found near permanent bodies of water, which can include lakes, ponds, slow-moving streams, and marsh. These frogs need to be in an area with an abundant source of low-growing vegetation as protection against predation. Chicken Creek is the only water body in the study area that might support this type of habitat. Impacts under Alternatives One, Two, and Three are the same: Habitat for spotted frogs could be affected if water quality was impacted (sedimentation) as a result of the proposed mine expansion and road construction; however, this potential impact would be avoided through proper construction and maintenance of sediment and runoff control measures as described in the **Soil and Water Conservation Practices (SWCP's) and Best Management Practices (BMP's)** included in this FEIS as **Appendix B** and in the Plan.



3.3.3.7 Rocky Mountain Elk

Impacts to Rocky Mountain elk are measured by the acres of suitable habitat that will be affected under each alternative and the number of months of protection to winter forage habitat provided by timing restrictions during the winter months.

- **Alternative One** – Under Alternative One, there are approximately 20 acres of existing disturbance: 11.3 acres of disturbance on the Forest and 9 acres of disturbance on private land. Within the Forest there are 10.6 acres of existing disturbance within key winter range and 0.3 acres of existing disturbance within general winter range.
- **Alternative Two** – Under Alternative Two, there are 94 acres of proposed disturbance to Rocky Mountain elk. The proposed disturbance on the Forest is 66 acres and the proposed disturbance on private land is 28 acres. Within key winter range there are 3.6 acres and 59.1 acres are within general winter range. These impacts would be minimal to the overall elk population within the Central Mountains Nebo elk unit; however, these impacts would result in long-term habitat loss and avoidance by individuals within this unit for the life of the mine.

Avoidance of the entire mine boundary could occur, especially by new individuals or calves that are not habituated to the existing level of disturbance. Activities leading to avoidance may include visual disturbance, human encounters, and noise. Avoidance during winter months could lead to reduced fitness; however, with the available habitat within the San Pitch Mountains, elk would most likely occupy other areas. Avoidance by elk could range from the 94 acres of proposed disturbance to 257 acres that are within the mine boundaries. The avoidance area depends on the noise habituation by elk that frequent this area and the success of the mitigations. Mitigations under Alternative Two include timing restrictions from November 15th to March 1st. This timing restriction provides 3.5 months of protection for big game.

- **Alternative Three** – The acres of disturbance would be the same as Alternative Two; however, mitigations under Alternative Three include timing restrictions from December 1st to April 15th. This timing restriction provides 4.5 months of protection for big game, extending longer into the spring (6 weeks longer than under Alternative Two) which is the most crucial period for big game during years of heavy snows. This timing restriction is also consistent with the Forest Plan (USDA, Forest Service 1986).

Habitat fragmentation is also a concern due to loss of habitat from mine expansion and if long-term avoidance occurs. Expansion of the mine and mine activities may interrupt seasonal movements of elk and cause them to avoid previously utilized portions of winter range. Avoidance of these winter habitats could result in habitat loss outside of the current and proposed mine boundaries. The longer winter range time restriction under Alternative Three should help to mitigate this impact.



3.3.3.8 Mule Deer

Impacts to mule deer are similar to Rocky Mountain elk and are measured by the acres of suitable habitat that will be affected under each alternative and the number of months of protection to winter forage habitat provided by timing restrictions during the winter months.

- **Alternative One** – Under Alternative One, there are approximately 20 acres of existing disturbance: 11.3 acres of disturbance on the Forest and 9 acres of disturbance on private land. Within the Forest there are 10.6 acres of existing disturbance within key winter range and 0.3 acres of existing disturbance within general winter range.
- **Alternative Two** – Under Alternative Two, there are 94 acres of proposed disturbance to mule deer. The proposed disturbance on the Forest is 66 acres and the proposed disturbance on private land is 28 acres. Within key winter range there are 3.6 acres and 59.1 acres are within general winter range. These impacts would be minimal to the overall mule deer population within the Central Mountains Nebo deer unit; however, these impacts would result in long-term habitat loss and avoidance by individuals within this unit for the life of the mine.

Avoidance of the entire mine boundary could occur, especially by new individuals or fawns that are not habituated to the existing level of disturbance. Activities leading to avoidance may include visual disturbance, human encounters, and noise. Avoidance during winter months could lead to reduced fitness; however, with the available habitat within the San Pitch Mountains, deer would most likely occupy other areas. Avoidance by mule deer could range from the 94 acres of proposed disturbance to 257 acres that are within the mine boundaries. The avoidance area depends on the noise habituation by deer that frequent this area and the success of the mitigations. Mitigations under Alternative Two include timing restrictions from November 15th to March 1st. This timing restriction provides 3.5 months of protection for big game.

- **Alternative Three** – The acres of disturbance would be the same as Alternative Two; however, mitigations under Alternative Three include timing restrictions from December 1st to April 15th. This timing restriction provides 4.5 months of protection for big game, extending longer into the spring (6 weeks longer than under Alternative Two) which is the most crucial period for big game during years of heavy snows. This timing restriction is also consistent with the Forest Plan (USDA, Forest Service 1986).

Habitat fragmentation is also a concern due to loss of habitat from mine expansion and if long-term avoidance occurs. Expansion of the mine and mine activities may interrupt seasonal movements of mule deer and cause them to avoid previously utilized portions of winter range. Avoidance of these winter habitats could result in habitat loss outside of the current and proposed mine boundaries. The longer winter range time restriction under Alternative Three should help to mitigate this impact.



3.3.3.9 Golden Eagle

Eight known golden eagle nests occur in the vicinity of the project area. Four nests occur in the Chicken Creek Drainage, three of which are within 0.5 mile of the current mining operations. All four nests are within 0.5 mile from the proposed mine expansion. Four other nests are located within the Pigeon Creek drainage to the north, with one nest falling within 0.5 mile of current mining operations. Three of the four nests are within 0.5 mile of the proposed mine expansion (USDA, Forest Service 2012). The eight nests were monitored in the spring of 2012. The Pigeon Creek 1 nest was active and produced one chick which successfully fledged. This nest is approximately 0.33 mile from the proposed activities at the East Mine, although it is in the opposite drainage with no direct line of site with the mine. The Pigeon Creek 3 nest was a tended nest within an active nest territory. Suitable nesting and foraging habitat for golden eagles is present in the project area. The proximity of the active nest to the project site indicates some tolerance and habituation to current mining activities.

- **Alternative One** – There would be no further impacts to suitable habitat under Alternative One other than those resulting from the currently permitted mining operations. Sunroc would not expand its mining operations on NFS lands and would only continue its operations in the previously approved mining areas. With the current approved operations 11.3 acres of suitable habitat on NFS lands have already been disturbed and 9 acres on private lands.
- **Alternative Two** – Under Alternative Two, there are 94 acres of proposed disturbance to suitable nesting and foraging habitat: 66 acres within the Forest and 28 acres on private lands. The impacts to foraging habitat would be minimal based on the large home range of golden eagles and the large amount of foraging habitat on the San Pitch Mountains. Minor increases in energy expenditure of eagles to locate prey could result but are not expected to affect nest success. The potential loss of any nests due to mining activities could contribute to the decline in nest activity.

Increased mining activity, in the form of visual disturbance and increased noise levels would occur with expansion of the mines. This could disrupt the nesting and foraging behavior of the known nesting pair in the vicinity. The magnitude of behavior modification would vary depending on the distance, intensity, visibility, and duration of the disturbance as well as the tolerance level of the eagles. Responses could vary from temporary startle (flush) and short avoidance flights, to long-term avoidance and abandonment of nesting and foraging areas. Habitat avoidance could range from 94 acres of proposed disturbance to 257 acres within the mine boundary. However, the potential for impacts to eagles using the Pigeon Creek drainage would be reduced due to intervening topography. Eagles not habituated to the current mining activities would be expected to have greater behavior modifications associated with the increased disturbance of the proposed expansion. Impacts to golden eagles nesting in the vicinity of the project area would be minimized by the golden eagle mitigations. Under these mitigations, mining activities for the Chicken Creek Mine will be modified to accommodate golden eagle nesting in accordance with U.S. Fish and Wildlife Service Utah Raptor Guidelines



(USDI, U.S. Fish and Wildlife Service 2002) and the Golden Eagle Monitoring Plan agreed to by Elaine Zieroth, Forest Supervisor (USDA, Forest Service 2002), if it is determined by a qualified U.S. Forest Service Biologist that mining activities could cause nest abandonment or failure. Refer to the Golden Eagle Monitoring Plan (USDA, Forest Service 2002) for specific mitigation measures.

- **Alternative Three** – The impacts to golden eagles under Alternative Three would be the same as those under Alternative Two.

3.3.3.10 Macroinvertebrates

Macroinvertebrates within and adjacent to the project area are dependent upon high water quality levels and low levels of siltation. SWCP's and BMP's are incorporated in this FEIS and in the Plan. These efforts would minimize or eliminate the potential effects of mine expansion on macroinvertebrates in the Chicken Creek Drainage.

3.3.4 Mitigation Measures Not Included in The Plan of Operations that Would be Applied to Alternative Three

Additional mitigation measures to be implemented under Alternative Three:

- Raptor nests, other than golden eagles, found within the area of mining activity would be protected by spatial buffers for active nests in accordance with the U.S. Fish and Wildlife Service Utah Raptor Guidelines (USDI, U.S. Fish and Wildlife Service 2002), if it is determined by a qualified U.S. Forest Service Biologist that mining activities could cause nest abandonment or failure. Seasonal buffers may be recommended from various mining activities (blasting, excavation, crushing, hauling, etc...) and can vary depending on the species, from 0 - 9 months.
- Mule deer and Rocky Mountain elk occur in the project area and timing restrictions will be placed on mining operations during the winter months, i.e., December 1 – April 15, of each year to prevent impacts to key winter foraging habitat.

3.4 MIGRATORY BIRDS

3.4.1 Introduction

The Migratory Bird Treaty Act imposes obligations on Federal agencies for the conservation of migratory birds and their habitats. Executive Order 13186 ensures that environmental analyses of Federal actions required by the National Environmental Policy Act or other established environmental review processes evaluate the effects of actions on migratory birds, with emphasis on species of concern.

3.4.2 Affected Environment

The Utah Partners in Flight Avian Conservation Strategy identifies 20 non-game migratory land



birds as priority species (Parrish et al., 2002). Thirteen of these species could be expected to occur on the San Pitch Division of the MLNF. **Table 3.9** lists these species, their habitat associations, and their consideration in this document. The USFWS list of Birds of Conservation Concern (USFWS, 2008) identifies 27 species within the Southern Rockies/Colorado Plateau Bird Conservation Region. Twelve of these species could be expected to occur on the San Pitch Division of the MLNF. **Table 3.9** lists these species. The Utah Division of Wildlife Resources identifies 44 bird species in the Utah Comprehensive Wildlife Conservation Strategy (Sutter et al., 2005). Twenty of these species could be expected to occur on the San Pitch Division of the MLNF. **Table 3.9** lists these species. The U.S. Geological Survey, Breeding Bird Survey (USGS, 2012) identifies 103 breeding species found along the Fayette flight path (approximately 12 miles south of the project area), the closest flight path to the project area. Of those 103 species, 12 also appear in **Table 3.9** among the species expected to be present in or near the project area.

Table 3.9
Priority Migratory Birds of Interest

Common name (<i>Scientific name</i>)	Species/Habitat Associations	Species Occurrence and Consideration in this Document
Bald Eagle (<i>Haliaeetus leucocephalus</i>) ³	Bald eagles utilize rivers and lakes during the breeding and wintering seasons. Snags and trees near open bodies of water are used as winter daytime roost sites. Bald eagles are primarily winter residents in Utah and may occur near the project incidentally during winter foraging and spring and fall migration.	Considered. Refer to Section 3.3 for a discussion of the bald eagle.
Black Rosy-Finch (<i>Leucosticte atrata</i>) ^{1,3}	Breeding grounds are above timberline in alpine tundra using barren, rocky, or grassy areas and cliffs among glaciers or at bases of snow fields. Altitudinal migrant, in winter can be found at lower elevations using open situations such as fields, cultivated lands, road sides, and human habitations (Parrish et al., 2002).	Not Considered. No adequate breeding grounds are located in the San Pitch mountains. No suitable habitat within the study area.
Black Swift (<i>Cypseloides niger</i>) ^{1,2,3}	Black Swifts require waterfalls for nesting. Nesting sites are above the surrounding terrain on cliffs. Riparian habitat is typically surrounded by coniferous forests and may include mountain shrub, aspen, or even alpine components (Parrish et al., 2002).	Not Considered. Only two confirmed breeding locations are known in Utah: Bridal Veil Falls and Aspen Grove areas (Parrish et al., 2002). Study area does not contain suitable breeding habitat.



Chapter Three – Affected Environment and Environmental Consequences

Common name (<i>Scientific name</i>)	Species/Habitat Associations	Species Occurrence and Consideration in this Document
Black-throated Gray Warbler (<i>Dendroica nigrescens</i>) ^{1, 2, 3,4}	Typically breed in pinyon-juniper communities in Utah; prefers more densely wooded areas. Lower slopes with mountain mahogany or scrub oak are also inhabited during breeding, but to a lesser extent (Parrish et al., 2002).	Considered. Study area contains juniper, mountain mahogany, and oak. Area is preferred breeding habitat.
Brewer's Sparrow (<i>Spizella breweri breweri</i>) ^{1,3,4}	Brewer's sparrows breed primarily in shrub-steppe habitats. However, they may be found in high desert scrub near shrub-steppe habitat as well as in large sagebrush openings in pinyon-juniper or conifer forests. Breeding habitats are usually dominated by big sagebrush.	Not Considered. Big sagebrush is critical habitat for Brewer's sparrow. The study area does not have suitable sagebrush habitat.
Broad-tailed Hummingbird (<i>Selasphorus platycercus</i>) ^{1, 3,4}	In Utah, primary breeding habitat is lowland riparian. They have also been recorded as breeding in mountain riparian, aspen, ponderosa pine, Englemann spruce, subalpine fir, and Douglas-fir (Parrish et al., 2002). Nesting typically occurs at elevations ranging from 6,000 to 10,600 feet near streamside habitat (Calder and Calder, 1992).	Considered. A perennial stream and associated riparian area occurs directly adjacent to the Project Area and could provide suitable habitat.
Cassin's Finch (<i>Carpodacus cassinii</i>) ^{2,4}	Cassin's finch breeds from southern Alberta, Canada, to the west-central United States in montane coniferous forests. In Utah, Cassin's finch is a year-round resident that is found statewide in high and mid-elevation forests (UDNR, 2011). There is no suitable habitat in or near the project area.	Not Considered. This project is below the elevational range for this species and there is no suitable habitat within or near the project area.
Ferruginous Hawk (<i>Buteo regalis</i>) ^{1,3,4}	Breeds in flat and rolling grasslands or shrub- steppe. Avoids high elevations, forest, and narrow canyons. Occurs in agriculture lands, sagebrush/salt brush/greasewood shrub lands and the periphery of pinyon-juniper forests (Parrish et al., 2002). Prefers elevated nest sites.	Considered. The Juab Valley is considered wintering habitat. The western foothills of the San Pitch mountains transitioning to the Juab Valley are considered breeding habitat (UDNR, 2012). Project Area is within 0.5 mile of suitable habitat for ferruginous hawks.



Chapter Three – Affected Environment and Environmental Consequences

Common name (Scientific name)	Species/Habitat Associations	Species Occurrence and Consideration in this Document
Golden Eagle (<i>Aquila chrysaetos</i>) ^{2,4}	The golden eagle breeds across western North America, from Alaska south to northern Mexico. Most populations in the western United States are year-round residents of the same area. This species is quite common in Utah. Typically this eagle is found in open country, especially in mountainous regions. Nests are constructed on cliffs or in large trees (UDNR, 2012).	Considered. There are golden eagle nests within the project area vicinity. Golden eagles may forage within the project area. See analysis for golden eagles in the MIS Section 3.3 of this EIS.
Grace's Warbler (<i>Dendroica nigrescens</i>) ²	Primarily breed in montane pine-oak forests, especially yellow pine or ponderosa pine dominated habitats. In Utah, suitable habitat is confined to coniferous forests of southern Utah.	Not Considered. The study area contains no suitable habitat and is farther north than identified habitat in Utah.
Gray Vireo (<i>Vireo vicinior</i>) ^{1, 2, 3,4}	Gray vireo breed on arid slopes dominated by mature pinyon-juniper, juniper, or oak woodlands that are relatively open. Moderate to steep slopes appear to be a critical factor, elevation does not appear critical as long as preferred habitat type is present. Proximity to water is not essential. (Parrish et al., 2002).	Considered. There is marginal suitable habitat within the project area.
Greater Sage-grouse (<i>Centrocercus urophasianus</i>) ^{1, 3}	Sage-grouse occur only in the sagebrush and sagebrush steppe ecosystems of western North America. Critical habitat is primarily big sagebrush along with wet meadows, forb-dominated meadows, and south and west-facing ridges and slopes where grouse are known to winter (Parrish et al., 2002).	Not Considered. Sage-grouse occupied habitat and potential habitat is well documented throughout Utah and the West. No suitable habitat is located on or near the Project Area.
Juniper Titmouse (<i>Baeolophus ridgwayi</i>) ^{2,4}	The Juniper titmouse is a common and widespread bird in Utah that occurs in most parts of the western United States. As its name would suggest, it is often found in areas containing pinyon-juniper woodlands. The juniper titmouse feeds on insects, seeds, and fruits. Tree cavities, including natural cavities and woodpecker holes, are used as nesting sites (UDNR, 2012).	Considered. There is suitable habitat for this species within the project area.
Lewis' Woodpecker (<i>Melanerpes lewis</i>) ^{1,2,3}	Primary breeding habitat in Utah is ponderosa pine. This species is attracted to burned over Douglas-fir, mixed conifer, pinyon-juniper, riparian and oak woodlands. Also found on the fringes of pine and juniper stands, and deciduous forests, especially riparian cottonwoods (Parrish et al., 2002).	Considered. There is marginal suitable habitat within the project area (UDNR, 2012).



Chapter Three – Affected Environment and Environmental Consequences

Common name (<i>Scientific name</i>)	Species/Habitat Associations	Species Occurrence and Consideration in this Document
Northern Goshawk (<i>Acipiter gentilis</i>) ³	The northern goshawk is a forest habitat generalist that uses a wide variety of forest ages, structural conditions, and successional stages.	Not Considered. Suitable goshawk habitat is over 0.5 miles away.
Osprey (<i>Pandion Haliaetus</i>) ³	In Utah, osprey are a rare summer resident at mountain lakes and along the Green River, and a rare migrant throughout the state. The habitat of this species is aquatic sites: rivers, lakes, and ocean coasts. Its foods are mostly fishes, but is also consumes some other vertebrates, as well as occasional crustaceans (UDNR, 2012).	Not Considered. No suitable habitat is on the site. Breeding and foraging habitat is over 6 miles away. Project area does not provide substantial foraging opportunities.
Peregrine Falcon (<i>Falco peregrinus</i>) ^{2,3}	Peregrine falcons can be found in a wide variety of habitats in the Intermountain West. They prefer to nest on high cliffs in mountainous areas or deep canyons.	Considered. The large foraging area utilized by peregrines could result in incidental occurrences in the Project Area. Refer to Section 3.3 for a discussion of Peregrine falcon.
Pinyon Jay (<i>Gymnorhinus cyanocephalus</i>) ^{2,4}	The pinyon jay occurs throughout much of the western United States, and is a common bird of the pinyon-juniper forests of Utah. It occurs in pinyon pine and juniper forests ranging into sagebrush (Peterson and Peterson, 1990). Pinyon-juniper woodland, less frequently pine; in non-breeding season, also occurs in scrub oak and sagebrush (NatureServe, 2012). It nest in shrubs or trees (e.g., pine, oak, or juniper), about 1.5-9 meters above ground.	Considered. Site contains suitable habitat and is identified as high value to critical habitat by the UDWR (UDNR, 2012).
Sage Thrasher (<i>Oreoscoptes montanus</i>) ^{3,4}	This species is considered a shrub-steppe obligate that requires healthy stands of mature sagebrush. It is a common resident of lowland desert in Utah (Sutter et al., 2005).	Not Considered. There are no suitable stands of sagebrush within the project area.
Southwestern Willow Flycatcher (<i>Empidonas traillii eximus</i>) ^{3,4}	Willow flycatchers are limited to riparian habitats, primarily willow. In Utah, only three breeding sites (all near St. George) have been confirmed, though areas of probable breeding occur across the south tier of Washington, Kane, and San Juan counties (Parrish et al., 2002).	Not Considered. The study area does not contain suitable riparian habitat. Study area is outside the known distribution of the southwestern willow flycatcher.



Common name (<i>Scientific name</i>)	Species/Habitat Associations	Species Occurrence and Consideration in this Document
Sage Sparrow (<i>Amphispiza belli nevadensis</i>) ^{1, 2, 3}	Prefers big sagebrush whether pure stands or interspersed with bitterbrush, saltbrush, shadscale, rabbitbrush, or greasewood.	Not Considered. There is no suitable habitat within the study area. The study area is above the elevation for nesting sage sparrows.
Virginia's Warbler (<i>Vermivora virginiae</i>) ^{1, 2, 3, 4}	Lower mountain habitats with dense Gambel oak and relatively high slope are preferred (Parrish et al., 2002).	Considered. Study area contains significant oak communities.
Yellow-billed Cuckoo (<i>Coccyzus americanus</i>) ^{1, 2, 3}	Considered a riparian obligate and found in large tracts of cottonwood/willow habitats with dense sub-canopies.	Not Considered. Study area does not contain suitable habitat.
Three-toed Woodpecker (<i>Picoides tridactylus</i>) ^{1, 3}	Occurs uncommonly in boreal forests of Utah and is dependent on recent burns and spruce bark beetle infestation for foraging. Found at high elevations in coniferous forests, usually nests above 8,000 ft elevation in Utah (Parrish et al., 2002).	Not Considered. Study area is below preferred nesting elevation and does not contain suitable habitat.
Williamson's Sapsucker (<i>Sphyrapicus thyroideus</i>) ^{2, 3}	Found in mountainous areas of the eastern two-thirds of Utah and is an uncommon breeder. Habitats are middle to high elevation coniferous forests and mixed deciduous-coniferous forests containing aspens (UDNR, 2012).	Not Considered. Study area lacks coniferous forests and aspen stands utilized by this species.

These species are listed as priority species by the Utah Partners in Flight Avian Conservation Strategy, Birds of Conservation Concern, and birds listed in the Comprehensive Wildlife Conservation Strategy that could occur on the San Pitch Division of the Manti-La Sal National Forest.

1. Utah Partners in Flight Avian Conservation Strategy priority species (Parrish et al., 2002).
2. USFWS Birds of Conservation Concern species (USFWS, 2002).
3. UDWR Utah Comprehensive Wildlife Conservation Strategy species (Gorrell et al., 2005).
4. Species has been identified along the Fayette Flight Route. USGS Breeding Bird Survey Route Map, (USGS, 2012).

Black-throated Gray Warbler

The breeding range of the black-throated gray warbler lies within the western U.S. and southern British Columbia, including Vancouver Island. Preferred breeding habitats for black-throated gray warblers include juniper woodlands and oakbrush. Lower elevations with mountain mahogany and scrub oak are secondary breeding habitats (Parrish et al., 2002). Nesting elevation in Utah is from 4,000 to 7,000 feet.

The black-throated gray warbler winters primarily in Baja California Sur, and on the Pacific slope and interior of Mexico. The bird occurs statewide as a common summer resident, first arriving in early May and leaving by late September (Parrish et al., 2002). The North American BBS data indicate an upward trend for the black-throated gray warbler in Utah, although caution



should be used with these data based on small sample size and/or low abundance (Sauer et al., 2011). The BBS route level analysis which includes specific BBS route data throughout North America has two routes within reasonable proximity to the project area. The closest route is the Fayette route located approximately 12 miles south of the project area. This route shows non-significant trends in observations, although the same caution should be used for this data based on small abundance and sample size (Sauer et al., 2011).

Both the East and West quarries are adjacent to primary and secondary breeding habitat for this warbler in juniper, oakbrush, and mountain mahogany communities. The study area is also within the identified elevation range for nesting by black-throated gray warblers.

Broad-Tailed Hummingbird

In Utah, the broad-tailed hummingbird breeds in riparian and adjacent habitats from about 4,500 to about 10,400 feet in elevation. Streamside habitat is preferred, although, broad-tailed hummingbirds have been known to breed in aspen, ponderosa pine, Engelmann spruce, sub-alpine fir, and Douglas-fir habitats. Statewide, the majority of the nests occur from about 6,000 to 8,000 feet in elevation. The broad-tailed hummingbird typically requires streamside areas adjacent to open patches of meadows or grasses with good quantities of wildflowers available throughout the breeding season (Parrish et al., 2002). The BBS identifies a steady decline of broad-tailed hummingbird point count observations since 1968 in Utah (Sauer et al., 2011). The Fayette route which is approximately 12 miles to the south of the mining area shows an insignificant decline in observations (Sauer et al., 2011).

Chicken Creek provides a minor amount of riparian habitat which could support the broad-tailed hummingbird. Both the East and West mine sites border Chicken Creek, and perennial grasslands, which could be used by the hummingbird for feeding, are found just north of the West site and just east of the East site.

Ferruginous Hawk

This species occurs throughout most of Utah in suitable habitat. It is most prevalent in the southern Bonneville Basin in southwest Utah and parts of the Colorado Plateau in eastern Utah. Absent from high-elevation regions, narrow canyons and sparsely vegetated desert flats, this hawk prefers flat and rolling terrain in grassland or shrub-steppe for breeding. Ferruginous hawks can also be found in agricultural areas, sagebrush/saltbrush/greasewood shrublands and on the edges of pinyon-juniper forests (Parrish et al., 2002). During the winter it will readily use open farmlands, grasslands, deserts, and other arid habitats where lagomorphs, prairie dogs, or other prey is available.

Pinyon-juniper forests in the study area provide potential habitat for ferruginous hawks, and the mine is located near agriculture areas in the Juab Valley that support a large prey base. The Juab Valley is considered wintering habitat for ferruginous hawk, and the western foothills of the San Pitch Mountains transitioning to the Juab Valley, including the study area, are considered primary breeding habitat (UDNR, 2012). No ferruginous hawk nests are known in the project area. It is unlikely that any nests would occur in the current mining boundary due to the hawk's



sensitivity to human disturbance and their propensity to abandon nests when human contact occurs within a territory early in the breeding season (Larsen, 2004).

The BBS survey data shows a downward trend in Utah from 1966-2009 (Sauer et al., 2011).

Gray Vireo

The gray vireo breeds locally from southern and east-central California, southern Nevada, southern Utah, northwestern and central New Mexico, southwestern Colorado, southwestern Wyoming, Arizona, and central Texas. In Utah, this species breeds on arid slopes dominated by mature pinyon-juniper or juniper woodlands of southwestern Utah north to Sevier County (Parrish et al., 2002).

The gray vireo is considered an obligate of semiarid, mature, relatively weed-free, pinyon-juniper, juniper, or oak woodlands that are relatively open with a shrubby under-story. It appears to be associated with moderate to steep slopes, although there is no quantitative data to support this (Parrish et al., 2002). The project area would be considered marginal for this species because the project area lacks mature stands of pinyon-juniper within the mining area.

The BBS data shows a slight upward trend for this species from 1966 – 2009 (Sauer et al., 2011).

Juniper Titmouse

The juniper titmouse is a common and widespread bird in Utah that occurs in most parts of the western United States. As its name would suggest, it is often found in areas containing pinyon-juniper woodlands. The juniper titmouse feeds on insects, seeds, and fruits. Tree cavities, including natural cavities and woodpecker holes, are used as nesting sites (UDNR, 2012).

The BBS data shows slight upward trends for this species from 1966-2009 and the titmouse has been observed in most years along the Fayette route, located approximately 12 miles south of the mining area (Sauer et al., 2011).

Lewis' Woodpecker

Lewis' woodpecker is a medium sized woodpecker that breeds in open forest and woodland, often logged or burned, including oak, coniferous forest, primarily ponderosa pine, riparian woodlands, and less commonly pinyon-juniper (NatureServe, 2012). This species prefers open ponderosa pine at high elevations and open riparian forests at lower elevations. It nests in natural cavities or abandoned northern flicker holes.

The project area is marginal due to the lack of ponderosa pine and riparian woodland habitat. The mine sites are predominantly open mountain brush and pinyon-juniper with steep slopes and exposed rock outcrops.

The Lewis' woodpecker has not been documented on the Fayette BBS route located 12 miles to the south of the project area.



Pinyon Jay

This pinyon jay is a highly social, cooperative-breeding, seed-caching bird distributed throughout the foothills and lower-mountain slopes of the western and southwestern United States (Balda, 2002). It is commonly found in pinyon-juniper woodlands throughout Utah.

The pinyon jay is a synchronized colonial nester that commences breeding in the cold of winter in areas where pine-seed crops were abundant the previous autumn. This is one of the earliest nesting passerines in the United States (Balda, 2002).

The diet of the pinyon jay consists primarily of pinyon and other pine seeds, but also includes berries, small seeds, grains, and insects. At times, pinyon jays may also eat bird eggs and hatchlings. When pine seeds are abundant, flocks may communally cache large numbers of seeds. The timing and location of breeding is tied to pine seed availability. Nests are built in loose colonies, and both parents participate in nest building. Nests are located in trees, usually conifers, five to thirty feet off the ground (UDNR, 2012).

The BBS trend data for Utah shows a significant decline of 4.3 percent per year from 1969 to 2009 (Sauer et al., 2011). This may be due to loss of pinyon-juniper from home development and construction. The Fayette route data shows that this species is commonly observed.

Virginia's Warbler

The breeding range of the Virginia's warbler lies almost entirely within the southwestern United States. Breeding habitat for Virginia's warbler is varied. Primary habitat is oak, but it is known to nest in mountain mahogany, juniper woodlands, and riparian areas (Parrish et al., 2002). All of these land cover types occur within the Project Area, and a total of 94 acres can be classified as potential breeding and foraging habitat for the Virginia's warbler (**Table 3.5**). Elevation for nesting in Utah ranges from 4,000 to 10,000 feet. Nests are typically found in areas of dense mountain brush or in streamside thickets (Parrish et al., 2002). This latter type of habitat is limited in the Project Area.

Virginia's warbler occurs statewide in Utah as a common summer resident. Earliest occurrence in the state is late April and the latest occurrence is mid-October. North American BBS data indicate an increasing population of approximately 2 percent throughout the range of Virginia's warbler from 1966 through 2009 (Sauer et al., 2011). BBS trends exclusively for Utah during that time period show a slight increase in population (Parrish et al., 2002). The Fayette BBS route located 12 miles south of the project area shows that this species is fairly common and has a relatively steady number of observations (Sauer et al., 2011).

3.4.3 Impacts

The evaluation criterion used to determine the potential effects of the proposed project on migratory birds is the acres of habitat that would be impacted or avoided by each species due to mining activities. **Table 3.5** identifies the acres of each land cover type by ownership that would be disturbed (i.e., vegetation removal) by the proposed project.



There would be no additional areas of disturbance under the No Action Alternative; thus, there would not be any new impacts to migratory bird habitat. Mining would continue in the Lower West Mine and East Mine until the currently permitted reserves at those sites were depleted. Mining would not advance further into NFS lands; therefore, no ground disturbing activities would occur outside the currently permitted area. Under Alternative One, mining operations on NFS lands are projected to cease in 2012.

Birds would continue to be disturbed by the current mining activity and would avoid the active mining areas. There is no mining within the riparian habitat along Chicken Creek, so migratory birds using this habitat would likely continue to use the habitat. Migratory birds currently using habitat such as shrubs or trees near the mine site would likely continue to use these habitats.

3.4.3.1 Black-throated Gray Warbler

- **Alternative One** – There would be no further impacts to suitable habitat under Alternative One other than those resulting from the currently permitted mining operations. Sunroc would not expand its mining operations on NFS lands and would only continue its operations in the previously approved mining areas. With the current approved operations 11.3 acres of suitable habitat on NFS lands have been disturbed and 9 acres on private lands.
- **Alternative Two** – Under Alternative Two the proposed expansion of mining operations would remove 53 acres of potentially suitable nesting habitat for black-throated gray warblers on NFS lands (juniper, oakbrush, and mountain brush cover types in Table 4). An additional 10 acres of potential nesting habitat would be removed on private land within the proposed expansion area (**Table 3.4**). In total, approximately 63 acres (0.14 percent) of potential black-throated gray warbler nesting habitat would be removed as a result of mining activities. There is approximately 42,400 acres of suitable nesting habitat within the San Pitch Division. Any nesting birds within this disturbed area would be displaced, and nesting activities disrupted.

Increased disturbances associated with mine expansion under Alternative Two would include human activity and noise from equipment and blasting. These disturbances could modify foraging and nesting behaviors. The magnitude of behavior modification would depend on the distance, intensity, and duration of the disturbance as well as the tolerance level of the bird. Responses could vary from temporary startle and being flushed, to permanent avoidance of the area around mining activities. Conversely, warblers could become habituated to regular, repetitive noises associated with mining activities.

- **Alternative Three** – Impacts under Alternative Three are the same as under Alternative Two.



3.4.3.2 Broad-tailed Hummingbird

- **Alternative One** – There would be no further impacts to suitable habitat under Alternative One other than those resulting from the currently permitted mining operations. Sunroc would not expand its mining operations on NFS lands and would only continue its operations in the previously approved mining areas. With the current approved operations 11.3 acres of suitable habitat on NFS lands have been disturbed and 9 acres on private lands.
- **Alternative Two** – Under Alternative Two impacts to broad-tailed hummingbirds would result in a loss of up to 1 acre of potential primary nesting habitat (the cottonwood land cover type); all of which occurs on private land (**Table 3.4**). Any nesting individuals utilizing this area at the time of expansion would be displaced and nesting attempts would fail. Mining activities would result in a loss of approximately 63 acres of potential foraging habitat. Impacts to foraging habitat would be minimal due to the 37,300 acres of foraging habitat within the San Pitch Division. No hummingbird nesting habitat on the Forest would be disrupted. Potential disturbances to broad-tailed hummingbirds from mine expansion activities would be similar to those discussed for black throated gray warblers.
- **Alternative Three** – Impacts under Alternative Three are the same as under Alternative Two.

3.4.3.3 Ferruginous Hawk

- **Alternative One** – There would be no further impacts to suitable habitat under Alternative One other than those resulting from the currently permitted mining operations. Sunroc would not expand its mining operations on NFS lands and would only continue its operations in the previously approved mining areas. With the current approved operations 11.3 acres of suitable habitat on NFS lands have been disturbed and 9 acres on private lands.
- **Alternative Two** – Impacts under Alternative Two would be the loss of 49 acres of suitable nesting and foraging habitat within the juniper woodlands (juniper woodlands, **Table 3.4**) and could displace nesting pairs, if present. There is approximately 8,200 acres of pinyon/juniper woodland on the San Pitch Division. Noise and disturbance in the project area could also lead to avoidance of hawks nesting in the vicinity. Other disturbance impacts, as described for the gray warbler, could also occur. There are no added months of protection for raptors other than golden eagles under Alternative Two. If active ferruginous hawk nests are identified in the vicinity of the project area, no seasonal and spatial restrictions on mining activity would be applied to minimize the potential for disturbance (see Section 1.1.4, Mitigation).



- **Alternative Three** – The impacts to nesting and foraging habitat would be the same under Alternative Three as for Alternative Two; however, there are spatial and seasonal buffers that could be implemented which would protect ferruginous hawks for 5 months during critical periods.

3.4.3.4 Gray Vireo

- **Alternative One** – There would be no further impacts to suitable habitat under Alternative One other than those resulting from the currently permitted mining operations. Sunroc would not expand its mining operations on NFS lands and would only continue its operations in the previously approved mining areas. With the current approved operations 11.3 acres of suitable habitat on NFS lands have been disturbed and 9 acres on private lands.
- **Alternative Two** – Under Alternative Two direct impacts would be result in a loss of 63 acres of potential breeding and foraging habitat (oak and juniper woodlands) is expected within the proposed mine expansion area. This would result in displacing nesting birds within the project area and disrupt any nest attempts. There is approximately 37,300 acres of suitable habitat within the San Pitch Division. Potential disturbances to gray vireos from mine expansion activities would be similar to those discussed for black throated gray warblers.
- **Alternative Three** – Impacts under Alternative Three are the same as under Alternative Two.

3.4.3.5 Juniper Titmouse

- **Alternative One** – There would be no further impacts to suitable habitat under Alternative One other than those resulting from the currently permitted mining operations. Sunroc would not expand its mining operations on NFS lands and would only continue its operations in the previously approved mining areas. With the current approved operations 11.3 acres of suitable habitat on NFS lands have been disturbed and 9 acres on private lands.
- **Alternative Two** – Under Alternative Two the proposed mine expansion would result in a loss of 40 acres of potential juniper titmouse nesting and foraging habitat on the Forest and an additional 9 acres on private lands (juniper woodlands, **Table 3.4**). There are approximately 8,200 acres of pinyon/juniper woodland on the San Pitch Division. This would result in displacing nesting birds within the project area and disrupt any nest attempts.
- **Alternative Three** – Impacts under Alternative Three are the same as under Alternative Two.



3.4.3.6 Lewis' Woodpecker

- **Alternative One** – There would be no further impacts to suitable habitat under Alternative One other than those resulting from the currently permitted mining operations. Sunroc would not expand its mining operations on NFS lands and would only continue its operations in the previously approved mining areas. With the current approved operations 11.3 acres of suitable habitat on NFS lands have been disturbed and 9 acres on private lands.
- **Alternative Two** – Impacts to Lewis woodpecker habitat would be similar to the impacts to the gray vireo under Alternative Two. A loss of 63 acres of secondary breeding and foraging habitat (oak and juniper woodlands) would be expected within the proposed mine expansion. There is approximately 37,300 acres of suitable habitat within the San Pitch Division. Potential disturbances to the Lewis woodpecker would be similar to those discussed for gray vireos and black throated gray warblers.
- **Alternative Three** – Impacts under Alternative Three are the same as under Alternative Two.

3.4.3.7 Virginia's Warbler

- **Alternative One** – There would be no further impacts to suitable habitat under Alternative One other than those resulting from the currently permitted mining operations. Sunroc would not expand its mining operations on NFS lands and would only continue its operations in the previously approved mining areas. With the current approved operations 11.3 acres of suitable habitat on NFS lands have been disturbed and 9 acres on private lands.
- **Alternative Two** – Under Alternative Two a loss of 63 acres of potential breeding and foraging habitat for Virginia's warbler is expected within the proposed mine expansion area. This would result in displacement of any nesting birds within the project area and disruption of nesting attempts. The loss of foraging habitat could cause Virginia's warblers in the adjacent area to expend more energy to find food. Decreased foraging opportunities for birds nesting adjacent to the project area could result in displacement of some individuals; however, given the abundance of potentially suitable habitat surrounding the project area, this impact is expected to be minor. Potential disturbances to Virginia's warblers from mine expansion activities would be similar to those discussed for black-throated gray warblers.
- **Alternative Three** – Impacts under Alternative Three are the same as under Alternative Two.



3.4.3.8 Pinyon Jay

- **Alternative One** – There would be no further impacts to suitable habitat under Alternative One other than those resulting from the currently permitted mining operations. Sunroc would not expand its mining operations on NFS lands and would only continue its operations in the previously approved mining areas. With the current approved operations 11.3 acres of suitable habitat on NFS lands have been disturbed and 9 acres on private lands.
- **Alternative Two** – Under Alternative Two the proposed mine expansion would result in a loss of 63 acres of potential pinyon jay nesting habitat (49 acres juniper and 14 acres oak, **Table 3.4**). Removal of foraging habitat could cause pinyon jays outside the project area to modify their foraging behavior as they may be required to expend more energy to locate quality foraging opportunities. However, given that there are approximately 8,200 acres of foraging habitat surrounding the project area, this impact is expected to be minor. Potential disturbances to pinyon jays from mine expansion activities would be similar to those discussed for black-throated gray warblers.
- **Alternative Three** – Impacts under Alternative Three are the same as under Alternative Two.

3.4.4 Mitigation Measures Not Included in The Plan of Operations

Additional mitigation measures to be implemented under Alternative Three:

- Raptor nests, other than golden eagles, found within the area of mining activity would be protected by spatial buffers for active nests in accordance with the U.S. Fish and Wildlife Service Utah Raptor Guidelines (USDI, U.S. Fish and Wildlife Service 2002), if it is determined by a qualified U.S. Forest Service Biologist that mining activities could cause nest abandonment or failure. Seasonal buffers may be recommended from various mining activities (blasting, excavation, crushing, hauling, etc...) and can vary depending on the species, from 0 - 9 months.
- Mule deer and Rocky Mountain elk occur in the project area and timing restrictions will be placed on mining operations during the winter months, i.e., December 1 – April 15, of each year to prevent impacts to key winter foraging habitat.

3.5 VISUAL RESOURCES

3.5.1 Introduction

This section describes the effects to the visual resource by the Sunroc Chicken Creek Gypsum Mine project. The visual resource analysis is based upon the Visual Management System (VMS) which is a tool used by land managers to identify the visual characteristics of the landscape, and



analyze in advance the visual effects of resource management actions (USDA-FS, Agricultural Handbook #462, 1974). The Forest Service developed VMS to help land managers create and maintain visual diversity and prevent unacceptable alteration of the landscape. Applying the VMS system will help to meaningfully compare and contrast the existing condition with the future condition of the proposed alternatives, if implemented. Two primary indicators are used in the visual resource analysis to measure impacts to visual resources:

1. Whether the project area and alternatives meet the Visual Quality Objectives (VQOs) established in the Manti-La Sal National Forest Land and Resource Management Plan (LRMP), also known as the Forest Plan, and;
2. Changes to the existing landscape character type as measured by acres of disturbed land.

3.5.2 Visual Quality Objectives (VQOs)

The Forest Plan establishes Visual Quality Objectives (VQOs) for the management of visual resources using the VMS process. As defined, VQOs refer to the degree of acceptable alteration of the natural landscape based upon the importance of esthetics (USDA-FS, Agricultural Handbook #462, p. 28, 1974). VQOs are determined by analyzing three basic components:

- Variety Class – uniqueness of a landscape relative to what is common;
- Sensitivity Level – concern level of a travelway based on the expectation of viewing scenery and the amount of use;
- Distance Zones – distance and visibility of a landscape from a given travelway.

Variety Classes are assigned according to the “scenic importance of a landscape based on human perceptions of the intrinsic beauty of landform, rockform, waterform and vegetative pattern” (USDA-FS 1986a, p A-29). Variety Classes may be classified as Class A – Distinctive, Class B – Common, or Class C – Minimal. The Sunroc Chicken Creek Gypsum Mine project area consists entirely of Class B visual resources, meaning that the project area contains features that are common throughout the Manti-La Sal National Forest and that are not outstanding in visual quality.

Sensitivity Levels are “a measure of people’s concern for the scenic quality of the National Forest” (USDA-FS, Agricultural Handbook #462, p. 18, 1974). Sensitivity levels are determined using those locations where visitors are most likely to view the environment: travel routes, use areas, or water bodies. Sensitivity Levels may be classified as: SL1 – high sensitivity, SL2 – average sensitivity, and SL3 – low sensitivity. Sensitivity Level 1 viewing areas include the Town of Levan and the Chicken Creek Scenic Backway (NFSR #50101). SL2 viewing areas include Utah State Highway 28 and Interstate Highway 15.

Distance Zones divide the landscape into three viewpoint perspectives: foreground, middleground, and background. Distance zones are determined on a case-by-case basis, yet even though an area may be physically located within one-half mile of a viewpoint, it may not be visible. Hence, areas are also labeled as “seen” or “unseen.” Distance zones are determined from seen SL1 viewing areas first, and then SL2. SL3 viewing areas are not used for evaluating distance zones. There are portions of the Sunroc Gypsum Mine project area that are seen and



unseen depending upon the viewing areas. The project area can be seen from the following viewing areas and distance zones:

- Foreground – East mine, Lower West mine, and proposed Upper West mine expansion areas are seen from the Chicken Creek Scenic Backway.
- Middleground Views – Lower West mine, and proposed Upper West mine expansion areas are seen from Highway 28 and from the Town of Levan.
- Background Views – Lower West mine, and proposed Upper West mine expansion areas are seen from I-15.

The combined values for variety class, sensitivity level, and distance zone results in a prescribed VQO or management goal for the prescription area. The five possible VQOs are Preservation, Retention, Partial Retention, Modification, or Maximum Modification. A VQO of Preservation has the most stringent visual restrictions, and a VQO of Maximum Modification has the least. The information in **Table 3.10**, below, provides a description of each VQO.

Table 3.10
VQOs for the Project Area

VQO	Objective	Duration of Visual Impact
Preservation (P)	Allows ecological changes only. Management activities, except for very low visual impact recreation facilities, are prohibited.	None
Retention (R)	Management activities are not visually evident and may only repeat form, line, color, and texture which are frequently found in characteristic landscape. Changes in their qualities of size, amount, intensity, direction, pattern, etc., should not be evident.	Objective should be accomplished either during operation or immediately after.
Partial Retention (PR)	Management activities may repeat form, line, color, or texture common to the characteristic landscape but changes in their qualities of size, amount, intensity, direction pattern, etc., remain visually subordinate to the characteristic landscape.	Objective should be accomplished as soon after project completion as possible or at a min. within first year.
Modification (M)	Management activities may visually dominate the original characteristic landscape, however, activities of vegetative and land form alteration must borrow from naturally established form, line, color, or texture so completely and at such a scale that its visual characteristics are those of natural occurrences within the surrounding area character type.	Objective should be accomplished in the first year or at a minimum of regional guidelines.



Maximum Modification (MM)	Management activities that alter landform and vegetation may dominate the characteristic landscape. However, when viewed as background, the visual characteristics must be those of natural occurrences within the surrounding area. When viewed as foreground or middle ground, they may contrast with the surrounding landscape features. Alternations may also be out of scale or contain detail which is incongruent with natural occurrences as seen in foreground or middle ground.	Reduction in contrast should be accomplished within five years.
Source: USDA-FS, Agricultural Handbook #462, p. 28-41, 1974.		

According to the Forest Plan, the existing portion of the Lower West mine located on NFS land and those areas proposed for expansion onto NFS land including the East mine, Lower West mine, and Upper West mine all have an established VQO of Partial Retention. This means that the objective is that the landscape may appear slightly altered but that noticeable deviations from an unaltered appearance should remain visually subordinate. In other words, mine activity should not dominate the view.

The Lower West mine does not currently meet the VQO of Partial Retention because it is the dominant feature when viewing the area, especially in the foreground and middleground. The existing areas proposed for expansion at the East Mine and Upper West Mine currently meet the VQOs of Partial Retention.

Although the Forest Plan provides direction and guidance for the management of visual resources on NFS lands administered by the Forest, NFMA implementing regulations at 36 CFR 219.15(a) allow for exception of authorizations of occupancy and use from being consistent with a forest plan if the forest plan expressly allows such occupancy and use, permit, contract, and other authorizing instrument for such use and occupancy. The Forest Plan makes this allowance through the statement, “As soon as practicable after the Forest Plan is approved, the Forest Service will ensure that, subject to valid existing rights, all outstanding and future permits and other occupancy and use documents which affect National Forest System lands are consistent with the Forest Plan” (Forest Plan, p. III-1). The Sunroc mining operation is a valid existing right under the General Mining Law of 1872; thus, the approval of the Plan for activities necessary for mining is an authorization that is an exception from the regulatory requirement of consistency with the Forest Plan. Therefore, any inconsistencies between proposed mine activities and Forest Plan prescribed VQOs would not require a Forest Plan amendment.

3.5.3 Landscape Character Description

The Sunroc Gypsum Mine project area is located in Chicken Creek Canyon on the western slopes of the San Pitch Mountains. The San Pitch Mountains are part of the Gunnison Plateau which rises prominently above Juab Valley and the nearby towns of Levan and Nephi. The steep and rocky slopes of the project area contrast sharply with the gentle valley below in terms of topography, vegetation, color, texture, and scale.



The landform characteristics of the general area are steep, rocky hillsides consisting of rock layers that have been folded, bent, or curved as a result of geologic deformation and faulting. Many of the steep slopes have been dissected by natural drainages resulting in the appearance of irregular diagonal lines and massive landforms. Color varies by season depending on snowpack. Winter hues are generally dull whites, blacks, and grays that create sharp contrasts where snow and ice intermix with exposed evergreen trees and shrubs. In the summer and fall, the dominant colors are muted greens, yellows, browns, and grays. The irregular growth patterns of trees and shrubs create an uneven texture ranging from coarse woodlands consisting of Utah juniper and oakbrush to medium shrublands consisting of mountain mahogany. The north facing slope where the west mine is located is heavily vegetated although there are areas of disturbance where little vegetation grows. The south facing slope where the east mine is located is much more sparsely vegetated.

Small rock outcrops are scattered unevenly over the slopes in the region. These outcrops draw the eye because they are complex features that contrast with the surrounding slopes due to their relative lack of vegetation, lighter hues, and jagged lines. Fugitive dust is occasionally visible from current mining activities in the vicinity. The town of Levan emits minor amounts of light onto the project area at night.

At the present time, only 11.3 acres of the lower west mine and no part of the East Mine are located on NFS land. The majority of the 11.3 acres has already been disturbed exposing mineral material that sometimes (depending on the lighting conditions and the distance away from the mine) resembles surrounding rock outcrops in terms of color and texture, but is highly visible due to its large size. The mine area is generally much brighter in color than the natural rock outcrops in the area, and is not interspersed with vegetation, so it prominently contrasts with the surrounding landscape. The sight of the exposed mineral material is very apparent when viewing the mine from the Chicken Creek Scenic Backway (NFSR #50101), the northern half of the Town of Levan, and driving south along Highway 28. The mine is only somewhat apparent from the southern half of the Town of Levan where it is partially screened by topography, and when driving south along I-15. The mine is visible but not apparent when driving north along Highway 28 or I-15. Reclamation requirements are prescribed under the existing Plan of Operation, but would not begin until the remaining ore authorized for removal is extracted by Sunroc.

3.5.4 Impacts to Visual Resources

This section will disclose the reasonably foreseeable impacts or environmental consequences to visual resources within the Sunroc Chicken Creek Gypsum Mine project area that would result from implementing the proposed alternatives and associated activities described in Chapter 2. Direct, indirect, and cumulative impacts will all be discussed.

The visual resource analysis is based upon the VMS scenery management tool, and recognizes that viewing angle, distance zones, viewer sensitivity, view duration, lighting conditions and other factors affect the overall level of contrast for each alternative. A computer model was used



to verify the visibility of the project area by identifying if specific areas were seen or unseen. The actual computer model, also known as a viewshed analysis, is available in the project record. This VMS analysis is based on the assumption that reclamation operations would succeed at establishing vegetation and that seeded vegetation would begin to resemble surrounding vegetation in terms of color and form after approximately five growing seasons. Two primary indicators are used in the visual resource analysis to measure impacts to visual resources: (1) Whether the project area and alternatives meet the Visual Quality Objectives (VQOs) established in the Forest Plan and (2) Changes to the existing landscape character type as measured by acres of disturbed land.

3.5.4.1 Alternative One (No Action Alternative)

If the No Action Alternative were implemented, Sunroc would continue to operate the mine within the previously approved mining areas, but no expansion would occur on NFS lands at the East Mine, the Lower West Mine, the Upper West Mine, but may or may not occur on adjacent private claims. Under existing approvals, the currently permitted reserves at the Chicken Creek Mine would be depleted in Summer 2012. No new ground disturbance would occur on the Forest and the 11.3 acres of existing disturbance on the Forest would remain until mining operations were completed. The impacts of this Alternative will serve as a baseline for which to compare the impacts of Alternatives Two and Three.

Alternative One VQOs

The effect of implementing the No Action Alternative would be that during mining operations and throughout the life of the Lower West Mine (less than 1 year), the area would continue to deviate from the standards set by the VQO of Partial Retention. Mining activities would continue to alter landform and vegetation causing visual impacts that dominate foreground and middle ground views and contrast with the characteristic landscape. Upon completion of the mining extraction efforts and after reclamation, it is possible that the West Mine area could meet the VQO of Modification depending upon the success of the reclamation efforts.

Alternative One Landscape Character Description

The short-term impacts of implementing the No Action Alternative are that the West Mine would continue to be visible to residents living in the northern half of the town of Levan, travelers along the Chicken Creek Scenic Backway (NFSR #50101) and going south-bound along Highway 28 and I-15. The exposed substrate would continue to contrast with the adjacent undisturbed NFS land in terms of color and texture because of the lack of vegetation and brightness of the substrate within the mine area. During mining operations the West Mine would continue to dominate the foreground view and would not mimic the lines, textures, or forms of naturally occurring rock outcrop features in the vicinity. There would be no additional ground disturbance, and therefore no net change in acreage to the character of the landscape.

Indirect visual impacts would occur in the form of fugitive dust and traffic. Fugitive dust would occasionally cause a low level of opacity in the air above the mine and associated haul roads over the short-term. Visual impacts from dust would be low and infrequent since water trucks



and spray equipment would be utilized to suppress dust when natural moisture is not adequate. Industrial mining traffic would continue to appear along the associated hauling roads.

In the long term, the area would be reclaimed according to the requirements specified in the currently authorized Plan which would diminish some of the visual impacts at the lower west mine. Color, texture, and line contrasts would diminish as equipment is removed, the rock faces contoured, and the area reseeded. It would take about 5 years for vegetation to establish itself in the reseeded area and obtain a more natural appearance, but even after reclamation, long-term impacts would still exist as the changes in landform (i.e., terracing) would still be visible, especially in the winter season.

3.5.4.2 Alternative Two (Proposed Action)

Under this Alternative, the Plan would be approved as submitted by the proponent and BMPs would be implemented. The mine would expand a total of approximately 66 acres onto NFS land at the East Mine, Lower West Mine, and Upper West Mine, and 0.5 miles of access road would be constructed to the Upper West Mine. Total disturbance on NFS lands would equal 77.3 acres. Mining would involve cutting 40 foot wide benches separated by 40 foot high vertical walls. The outer 17.6 feet of each bench would be cut at a 1H:1V (45°) angle. Vegetation would all be removed during mining activities. Night lighting will seldom be used at the mines, but in the winter season when the days are short, the east mine is likely to use night lighting for two hours at the beginning and two hours at the end of the shift (normal working hours are between 7:00 a.m. and 5:00 p.m.). Based on this alternative, the operational life of the East Mine is estimated to be approximately 128 years and the West Mine to be approximately 52 years. Upon reclamation, the inside of each bench would be sloped with fill material and topsoil at 1.5H:1V (33.8°), then revegetated. The Plan would leave approximately 7.4 feet of exposed, unvegetated, vertical high wall between benches. Reclamation would be complete after the operational life of the mine is over, all plans are implemented, and vegetation becomes re-established.

Alternative Two VQOs

The effect of implementing Alternative Two (Proposed Action) would be that during mining operations and throughout the life of the mine (approximately 52 years at the West Mine and approximately 128 years at the East Mine) none of the existing mine areas or proposed expansion areas would meet the VQO of Partial Retention. All of the areas would deviate from the Partial Retention VQO standards. As compared to the No Action Alternative, mining activities proposed in this alternative would more severely alter landform and vegetation and contrast with the characteristic landscape. Visual impacts would dominate foreground and middle ground views, and therefore, all of the mine area would better conform to the VQO standards of Maximum Modification. After reclamation, it is possible that all mine areas could meet the VQO of Modification depending upon the success of the reclamation efforts. Because the Lower West Mine and Upper West Mine would be mined and reclaimed consecutively, at no one time would the entirety of the impacts be seen



Alternative Two Landscape Character Description

Indirect visual impacts (i.e., dust and traffic) from both mines would be similar to those described for the No Action Alternative but would exist for a much longer period of time since they are tied to the 128 year operational life of the East Mine and the 52 year life of the West Mine. The appearance of fugitive dust and industrial mining traffic along haul roads would likely increase as production rates increased. When early morning and late afternoon lighting occurs during the winter months it may temporarily illuminate dust and/or the sky but it would not have much of an impact on visual resources given the limited seasons of use and times of day in which it would be used.

East Mine – Under this alternative, the East Mine would expand 41.3 acres onto NFS lands. During mining operations, the proposed mine benches and faces would appear heavily altered from numerous foreground and middleground views from the Chicken Creek Scenic Backway (NFSR 50101). Although, the mine would be confined to a southern aspect of the Chicken Creek drainage, travelers on the NFSR 50101 would notice surface disturbance and landform alternations from up to a mile away before topography screened it out of view. The gray and tan hues of substrate at the mined area would be lighter values than colors of the surrounding hillside, and the amount of bare ground and overall size and scale of the mine would dominate views from NFSR 50101. The removal of mineral material would reduce the dimensional mass of the hillside changing its shape in a localized area. Road and terrace features would create long and unbroken lines at shallow or horizontal angles. Lines features would be bold and long along the mine margins and vegetated areas. Textures would be coarse during operation due to the appearance of rock piles roads and structures. Mining equipment, rock piles, and structures would all be visible at the mine administration area as travelers pass the mine access road. View duration from NFSR 50101 would typically last five to ten minutes since most observers would be driving. The majority of the proposed east mine expansion area would not be visible from Juab Valley due to line of site obstructions, so no visual impacts are expected from the town of Levan, Highway 28, or I-15.

Lower West Mine and Upper West Mine Expansion – The lack of vegetation, exposed substrate, and landform alterations at the lower west mine would result in color, form, and texture contrasts similar to those described for the No Action Alternative but would appear more extensive, be visible from greater distances, and remain visible for a longer time-frame. During mining operations, effects would be similar to those described for the east mine. Bare ground would continue to be the most apparent direct visual impact, becoming more noticeable compared to the No Action Alternative as mining operations expand to the upper west mine area. Linear features would be more apparent compared to Alternative One due to the road cuts that would traverse the hillside from the lower mine area to the upper mine area. The total acreage of surface disturbance on NFS lands at the West Mine would increase from the current 11.3 acres to 36.0 acres (including the additional proposed 24.7 acres of disturbance). The West Mine would not be visible in its entirety from any single location due to line of site obstructions such as topography. Observers from areas of the Juab Valley south of Levan who were unable to see any surface disturbance under the No Action Alternative, would be able to see surface disturbance at



the Upper West Mine under Alternative One since it would expand to southwest aspects of the hillside. The visual impacts of the mine expansions would be easily seen from the Juab Valley from I-15, along a 15 mile stretch of Highway 28 through Levan, from the town of Levan, and along the Chicken Creek Road until the canyon obscures visibility.

Reclamation – The Plan proposes a reclamation slope cut and fill scenario. The hillsides would consist of a series of benches and high walls. The outer 17.6 feet of each bench would be cut at a 1H:1V (45°) angle. The inside of each bench would be sloped with fill material and topsoil at 1.5H:1V (33.8°), then revegetated. The Plan would leave approximately 7.4 feet of exposed, unvegetated, vertical high wall between benches (Figure 110-1, NOI document). The vegetation would probably not be able to re-establish itself on a 1H:1V slope, but could do so on a 1.5H:1V slope. Therefore, under this reclamation scenario, there would probably be a series of unvegetated areas 25 feet in height alternating with vegetated areas 15.0 feet in height that create a striped visual affect. Reclamation would be complete after the operational life of the mine is over, all plans are implemented, and vegetation becomes established.

Reclamation of the East and West mines would begin to diminish visual contrasts for the same reasons discussed in the No Action Alternative, but long-term visual impacts would be greater in magnitude and extent. Contrasts in landscape form would be apparent over the long-term as the reduction of the overall mass of the hillside and the terrace features would be noticeable at both mines when viewed from NFSR 50101. Terrace features at the west mine would also be visible from Highway 28. Color contrasts between the terrace benches and faces would dominate views from NFSR 50101. A banding effect would occur when snowfall on the terrace benches remains but melts away from the faces as has been observed at the Henry Mine a few miles south of Chicken Creek. Hence, snowfall would promote visibility of terrace features each season until seeded vegetation grew tall enough to break up horizontal bands. Reclamation would not be complete for approximately 133 years at the East Mine (128 years of operation + 5 years to grow vegetation in reclamation area) and for 31 years at the Lower West and Upper West mines, consecutively (26 years of operation at each mine + 5 years of recovery).

3.5.4.3 Alternative Three (Preferred Alternative)

Under this alternative, the Supplemental Plan of Operations would be approved, but with additional conditions added to protect non-mineral natural resources on the Forest. As with Alternative Two, the mine would expand an additional 66.0 acres on NFS lands for a total disturbance area of approximately 77.3 acres at the East Mine, Lower West Mine, and Upper West Mine. Construction of 0.5 miles of access road to the Upper West Mine is included in the 66.0 acres of new disturbance. The operational life and extent of the mine would be the same as described under Alternative Two. SWCPs and BMPs would still be implemented and reclamation would occur as specified in the Plan, but in addition, the mitigation measures listed in Section 2.2.1.3 would be required of the proponent. Short-term and long-term impact time-frames are the same as those described for Alternative Two for consistent comparison. The following mitigation measures address visual resource concerns:



- Mined out areas should be reclaimed one section at a time as active mining operations progress into other areas of the mine.
- All overburden shall be retained on-site for use during reclamation efforts.

Alternative Three VQOs

The effect of implementing Alternative Three (Mitigation Measures) would be about the same as Alternative Two in that neither the East Mine, the West Mine, nor the West Mine expansion area would meet the VQO of Partial Retention throughout the life of the mine (approximately 128 years at the East Mine and 52 years at the West Mine) and during mining operations, but would better conform to the VQO standards of Maximum Modification. However, with the implementation of the additional conditions of approval required by this alternative, it is possible that the East Mine, Lower West Mine, and Upper West Mine areas could better meet the VQO Modification standards after reclamation, depending upon the success of the reclamation efforts.

Alternative Three Landscape Character

Indirect visual impacts (i.e., dust and traffic) would be the same as those described for Alternative Two.

East, West, and Upper West Mines – Under this alternative, as with Alternative Two, the mining operation would expand an additional 66.0 acres onto NFS lands; total disturbance on NFS lands would be 77.3 acres. The lack of vegetation, exposed substrate, and landform alterations at the East, West, and Upper West Mines would result in color, form, and texture contrasts similar to those described for Alternative One during the mine's operational life, a period of approximately 128 years at the East Mine and 52 years at the West Mine.

Reclamation - Reclamation plans at the East, West, and Upper West Mines that include the implementation of the additional conditions of approval could diminish visual contrasts over the long-term compared to Alternative Two if they are successful at either screening views of the reclaimed mine or reducing the appearance of terrace features at the mine. Post mining reclamation could mitigate some of the visual effects depending on lighting and snow cover. Without snow cover and after the vegetation is established, mine benches may appear to blend in with the natural landscape, but the color contrast between mine benches and faces would likely remain during snow cover. Increasing soil depth during reclamation would increase the potential to establish shrubs and trees along terrace features. Planting native trees and shrubs randomly along the terrace features would diminish visual impacts at both mines as the height of the trees would partially screen surface disturbance reducing the appearance of horizontal and repetitive bands of exposed minerals along the high wall. Visual resource impacts are compared for each alternative in **Table 3.11**, below.



Table 3.11
Visual Resource Impacts

	Alternative One			Alternative Two			Alternative Three		
Mine Area	East	West	Total	East	West	Total	East	West	Total
Existing Condition Meets VQOs?	Yes	No	No	Yes	No*	No*	Yes*	No*	No*
Meets VQOs During Life of Mine?	Yes	No*	No*	No*	No*	No*	No*	No*	No*
Meets VQOs After Mine Reclamation?	Yes	No*	No*	No*	No*	No*	No*	No*	No*
Existing Forest Disturbance (acres)	0	11.3	11.3	0	11.3	11.3	0	11.3	11.3
New Forest Disturbance (acres)	0	0	0	41.3	24.7	66.0	41.3	24.7	66.0
Total Disturbance to landscape (acres)	0	11.3	11.3	41.3	36.0	77.3	41.3	36.0	77.3

* Although these alternatives do not meet VQOs, no Forest Plan amendment is needed because this is a pre-existing right under 36 CFR 219.15(a) and Forest Plan, p. III-1.

3.6 SOCIOECONOMICS

3.6.1 Social Conditions

3.6.1.2 Introduction

23 U.S.C. 109(h) mandates consideration of social and economic impacts to the human environment. Council on Environmental Quality (CEQ) regulation 40 C.F.R. 1508.14 requires that an EIS discuss economic and social effects of a proposed action if these effects are directly related to effects on the natural and physical environment.

The analysis was conducted to evaluate social and economic conditions and impacts as a result of the proposed project. For analysis purposes, the region of influence (study area) encompasses Juab County, and generally the communities of Levan and Nephi. Levan is located two miles west of the Chicken Creek Mine on State Highway 28, and Nephi is located 10 miles north of Levan, Utah, on I-15. Data was gathered from online research that included the 2000 US Census Bureau and the 2007 US Census Bureau estimates, and was also gathered during phone conversations with city and county staff.

3.6.1.3 Affected Environment

The proposed mining operation is located in Juab County on the Manti-La Sal National Forest and on private land. Sunroc Corporation's proposed Plan is to (1) add additional NFS lands that can be mined at the Chicken Creek East and Chicken Creek West mines, (2) construct an access road and add additional acreage to be mined in the Chicken Creek Upper West Mine, and (3)



increase the mining operations on private land. The Plan proposes a disturbance of 77.3 acres on NFS land (11.3 acres of existing disturbance at the West Mine + 66.0 acres of future disturbance at the East and West Mines = 77.3 acres) and 37.1 acres on private land (9.0 acres of existing disturbance + 28.1 acres of future disturbance = 37.1 acres).

The primary access to the Chicken Creek Mine is from the town of Levan on the county road which turns into NFSR 50101 at the Forest Service boundary approximately 1.5 miles up Chicken Creek Canyon. The Chicken Creek Mine is located two miles east of the town of Levan. There are 12 to 15 employees working at the mine at any given time. Sunroc has indicated that none of the employees currently working at the mine live in Levan, and that all of them commute from the Nephi area.

The community of Levan is rural and many of the residents make a living by agricultural means. The town has a post office, one gas station/convenience store, and a fast food restaurant. There are no local grade schools in the community and most of the children go to school in Nephi or Mona, Utah. The closest medical facility, Central Valley Medical Center, is located in Nephi. The community of Levan had an estimated population of 864 in 2008 (City-data, 2009a). There is a campground located approximately 4.5 miles east of the town of Levan, and 2.5 miles east of the Chicken Creek Mine, on NFSR 50101. The area is also used for dispersed camping and ATV and snowmobile use (on the roadway).

Nephi is a larger more urban town located 10 miles north of the Project Area. Nephi has two hospitals, one fire department, a county sheriff's office, three elementary schools, two junior high schools, one high school, and the county courthouse. Nephi also has one post office, several gas station/convenience stores, and approximately thirteen restaurants. The population of Nephi in 2008 was estimated to be 5,408 (City-data, 2009b).

Juab County had an estimated population of 9,604 in 2007 (City-data, 2009c). Fifty-five percent of the Juab County population lived in an urban environment and 45 percent lived in a rural environment. The average household size was 3.3 persons. The racial profile of Juab County consisted of the following: White Non-Hispanic (95.8 percent), Hispanic (2.6 percent), American Indian (1.5 percent), two or more races (1.0 percent), and other races (0.9 percent) (City-data, 2009c).

3.6.1.4 Impacts

3.6.1.4.1 Alternative One (No Action Alternative)

Under this alternative the mine would continue operations until Summer 2012. Current approved operation plans would continue to guide the mining operation. Sunroc would continue to operate the mine, but no expansion to additional areas on the Forest would occur in the Lower West Mine, the Upper West Mine, or the East Mine. Future mining operations could only continue on private lands.

After the mine closes there would be 12 to 15 unemployed workers from the mine. These workers may move away from the Nephi area in order to find new employment opportunities. As



unemployed workers move away from the area it may cause a small decrease in the amount of money and time being spent in the community on social activities. These impacts would be long-term; however, they would not be considered large as the decrease in the population in Nephi would be less than 0.01 percent and would likely not be noticed by the community at large.

3.6.1.4.2 Alternatives Two (Proposed Action) and Three (Preferred Alternative)

Under Alternatives Two and Three the social impacts would be similar. The mine would continue operations for approximately 128 years. Employees currently working at the mine would likely continue to work at the mine and would not move out of their communities. They would continue to contribute time and money in their communities. This would be a long-term beneficial impact to the communities by keeping people in the area to maintain the community. It is likely that these workers would continue to commute from Nephi unless the town of Levan developed new urbanized areas that would provide homes, shopping, and other social resources. It is unlikely that the continued operation of the mine site would induce Levan to develop new areas just for mine employees as there are not enough employees to make it socially or economically feasible.

3.6.1.5 Mitigation Measures Not Included in The Plan of Operations

There are no specific mitigation measures identified for social resources.

3.6.2 Economic Conditions

3.6.2.1 Introduction

23 U.S.C. 109(h) requires consideration of social and economic impacts to the human environment. CEQ regulation 40 C.F.R. 1508.14 requires that an EIS discuss economic and social effects of a proposed action if they are directly related to effects on the natural and physical environment.

The Juab County Master Plan is currently being updated and is not expected to be released until after this EIS is completed. In order to understand the anticipated development in the region, Byron Woodland, the Juab County Director of Business Development, was interviewed over the telephone on February 11, 2009 (Woodland 2009). He explained the proposed projects, developments and anticipated business development for the area of Levan and Nephi. Other economic data was gathered from online research that included the 2000 US Census Bureau internet website and the 2007 US Census Bureau estimates, as data is used it is cited in the sections below.

3.6.2.2 Affected Environment

Employment

In 2007 the labor force was 4,063 in Juab County with a 3.2 percent unemployment rate (Census 2009e). The following table (**Table 3.12**) shows the number of employees in each economic sector in Nephi as reported by the U.S. Census Bureau. Nephi is used because it gives a better



representation of the workforce that would be available at the mine site, as all of the employees commute from Nephi to work at the mine, none of the mine employees live in Levan.

Table 3.12
Employed Civilian Population 16 Years and Older (2000)

Industry	Number of Employees
Agriculture, forestry, fishing and hunting, and mining	58
Construction	230
Manufacturing	323
Wholesale trade	68
Retail trade	272
Information	48
Finance, insurance, real estate, and rental and leasing	73
Professional, scientific, management, administrative, and waste management services	61
Educational, health, and social services	334
Arts, entertainment, recreation, accommodation and food services	316
Other services (except public administration)	56
Public administration	83

(Census, 2009d)

Approximately 83 percent of the labor force earned a private wage or salary, 13 percent worked for government agencies, and 4 percent were self-employed (Census, 2009d).

Income

The median household incomes for Levan, Nephi City, and Juab County were reported in the 2000 Census. The reported median household incomes were the following (Census, 2009a & b):

- Levan \$34,632
- Nephi City \$38,918
- Juab County \$38,139

The median household incomes reported were lower than those of Utah statewide which were \$45,726 (Census, 2009c).

Business

The town of Levan has a post office, one gas station/convenience store, and a fast food restaurant. Although most employees pack a lunch for the work day, occasionally they purchase food at the convenience store in Levan.



3.6.2.3 Impacts

3.6.2.3.1 Alternative One (No Action Alternative)

Under Alternative One, current approved operation plans would continue to guide the mining operation. Sunroc would continue to operate the mine, but no expansion to additional areas on the Forest would occur in the Lower West Mine, the Upper West Mine, or the East Mine. Future mining operations could only continue on private lands.

The direct effect is that mining could stop as soon as Summer 2012 and 12 to 15 regular employees at the mine would lose their jobs. Also, Sunroc would no longer pay property taxes which benefit state, county, and local programs. These two factors would impact community economic vitality because many of the employees working for the Chicken Creek Mine could move out of the area if they lost their job in order to find work with another mining operation, as most of these employees have specialized in working at a mine operation. The loss of jobs could also indirectly impact housing values if the employees have to relocate in order to find other employment. Another indirect effect of mine closure could be a loss of county services that were partially funded by mine property taxes and the taxes that the employees pay. The local retail economy could also be impacted because the employees would no longer have the same purchasing power, meaning the employees who lost their jobs would likely not purchase as much, or would not purchase higher priced items.

3.6.2.3.2 Alternative Two (Proposed Action)

Under Alternative Two the Forest would approve the Plan as it was submitted. The Plan would add additional mining on claims on NFS lands to the Chicken Creek East and Chicken Creek West mines, and add an access road and additional mining on claims on NFS lands to the Upper Chicken Creek West area within the existing mining claims area. The Plan proposes a disturbance of 77.3 acres on NFS land (11.3 acres of existing disturbance on the West Mine + 66.0 acres of future disturbance on the East and West Mines = 77.3 acres) and 37.1 acres on private land (9.0 acres of existing disturbance + 28.1 acres of future disturbance = 37.1 acres).

Future mining production will be based on market requirements. Under the proposed mining plan, approximately 1,950,000 tons of gypsum (corresponding to 13 years of mining) would be added to the permitted reserves at the Lower West Mine; approximately 1,900,000 tons (corresponding to 13 years of mining) would be added to the permitted reserves at the Upper West Mine; and approximately 15,340,000 tons (corresponding to 102 years of mining) would be added to the permitted reserves at the East Mine. These production year estimates are based upon the current Air Quality Permit that restricts production to 150,000 tons per year. The Plan proposes to operate the East Mine concurrently with, first, the Lower West Mine and then, second, (after the reserves are exhausted at the Lower West Mine) with the Upper West Mine. The Lower West Mine and Upper West Mine would be mined consecutively, not concurrently. After the reserves at the Lower West Mine were exhausted, operations would begin at the Upper West Mine. Under this proposal the Lower and Upper West mines would have a mine life of approximately 26 years each and the East Mine would have a mine life of approximately 128 years.



Approval of The Plan would allow for continued employment of mine personnel. Sunroc employs 12 to 15 full-time workers at the Chicken Creek Mine. The average wage at the Chicken Creek mine is \$27.00 per hour.

Approval of the Plan would allow Sunroc to continue operating for approximately 52 years at the West Mine and for approximately 128 years at the East Mine. The mining operation would provide tax base which would continue to contribute to supporting County services. The property taxes Sunroc paid in 2007 associated with this mine were approximately \$8,400. It is estimated that property taxes would remain approximately the same with minor increases due to inflation.

3.6.2.3.3 Alternative Three (Preferred Alternative)

Alternative Three would allow for Forest approval of the Plan with provision as specified throughout this document. There are no socioeconomic provisions recommended. The impacts would be the same as for Alternative Two. There are no specific additional mitigation measures for socioeconomics associated with Alternative Three. The mine currently operates under a seasonal winter closure and this closure would continue under Alternatives Two and Three. This seasonal closure has already been anticipated by the workforce, and there would not be additional impacts to income unless the mine had to close for a longer period of time. If the mine had to discontinue operations for a longer period of time due to other seasonal restrictions such as for migratory bird nests, then the employees may need to find temporary jobs during the seasonal closures for wildlife. This may cause some burden on the employee as it may be difficult to find a job for a short period of time while the mine is temporarily closed. This is the current situation under the existing operation; no change is expected under either action alternative.

3.6.2.4 Mitigation Measures Not Included in The Plan of Operations

There are no specific economic mitigation measures identified.

3.6.3. Environmental Justice

All projects involving Federal action (funding, permit, or land use) must comply with Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, signed by President Clinton on February 11, 1994. This EO directs Federal agencies to take the appropriate and necessary steps to identify and address disproportionately high and adverse effects of Federal projects on the health or environment of minority and low-income populations to the greatest extent practicable and permitted by law. Low income is defined based on the Department of Health and Human Services' poverty guidelines. Minority populations are defined as populations that have little representation in the community based on the demographics of the particular community.

There are not any Environmental Justice populations that would be disproportionately impacted by the proposed action.



3.7 WATER RESOURCES

3.7.1 Introduction

The culinary water supply for the city of Levan is supplied by ground water from Tunnel and Rosebush Springs (**Figure 1-2**). Members of the public have expressed a concern that mine blasting may negatively impact water supplies from Tunnel and Rosebush Springs, causing the culinary water supply to be altered or disrupted. The proposed mine expansion and mining practices are also of concern.

Rose Bush Spring and Tunnel Spring are drinking water supply sources for the City of Levan. Rose Bush Spring is located at the southwest corner of Claim 1E, on the south side of Chicken Creek (**Figure 1-2**); it is approximately 700 feet down-gradient from the nearest proposed disturbance at the East Mine and is located up-gradient from the West Mine. Tunnel Spring is located approximately 700 feet northwest and down-gradient of the West Mine disturbance area. It is located on the same side of the canyon as the West Mine operating area; however, the existing runoff diversion channel adjacent to the current West Mine pit access road diverts runoff from the currently disturbed area away from Tunnel Spring.

Removal of vegetation, blasting activities, excavation of ore, movement of other earth material, and construction of mining haul roads could impact the water resources of Chicken Creek and Juab Valley. Increased and long-term road traffic on the County road could also impact the water quality of Chicken Creek. Mine stock piles could increase sediment loads in runoff. This EIS and the Plan include SWCP's and BMP's and other design features to improve water resource protection [(refer to **Appendix B, Soil and Water Conservation Practices (SWCP's) and Best Management Practices (BMP's)**)]. Some of the SWCP's/BMPs to be used during mining operations include a series of sedimentation basins, diversions berms, check dams, and silt fencing. These SWCP's/BMPs and design features are required and will be followed for all alternatives considered.

3.7.2 Analysis Methodology

A literature review was conducted to evaluate the hydrological conditions of the project site and the historical impacts to groundwater supplies from mining at the Chicken Creek Mine. Special emphasis was placed on the potential impacts from mine operations, including blasting, to disrupt municipal water service to Levan. As a result of data gaps remaining from previous hydrogeologic investigations, an additional hydrogeologic study and report were requested by the Forest Service in February 2011 to answer specific matters pertaining to the mining operations and the resulting possible impacts to water resources in the area.

Affected Environment

Generally, highlands are recharge areas and lowlands are discharge areas. The East Mine and Lower West Mine are in ground water recharge areas to Chicken Creek; the Upper West Mine is in the recharge area for southern Juab Valley to the southwest. In areas with pronounced local relief, as found in the project area, local ground water systems (rather than regional ground water



systems) are more likely to develop. However, the existence of a high permeability conduit such as a fractured limestone (the Arapien Shale is fractured and has limestone units) at depth would promote the formation of a regional ground water flow system that would allow water to travel beyond topographic divides. In the mining area, a complex relationship exists between various geologic formations. It is possible that unknown geologic conditions could create a ground water system that crosses topographic divides.

As part of the Plan's preparation EarthFax Engineering conducted both a geologic and hydrogeologic evaluation of the Tunnel and Rose Bush Spring areas (EarthFax, 2009). Their presentation is summarized in the following two paragraphs.

The purpose of this evaluation was to determine if the current mining activity being conducted by Sunroc would adversely affect these water resources as they are used for culinary water for the town of Levan. Both springs are currently being captured below the ground surface of their historical point of emersion. Tunnel springs consists of three subsurface collection catchments, the closest catchment is more than 1,200 feet west of the West Mine Site. Rose Bush Spring consists of two subsurface collection catchments; the closest catchment is approximately 700 feet west of the proposed East Pit disturbance. Both of these springs emerge near stream level, at the base of relatively small catchment basins. Tunnel Spring catchment basin is hydrologically separated by minor ridge divides from present and proposed mining disturbances to the geology and topography. Both springs originate and emerge from the geologic unit known as the Arapien Shale. This geologic unit is also where the gypsum deposits exist. Due to the broken-up nature of the Arapien shale unit, with its relatively low clay content, and its minor, fractured limestone inclusions, groundwater is able to flow freely throughout this unit. Groundwater flow paths in this unit tend to follow existing topography (EarthFax, 2009).

Two of the spring collection systems located in the lower stretch of Chicken Creek Canyon are Rosebush and Tunnel Springs; they feed the Levan culinary water system and are owned by the Town of Levan. Sunroc has worked with the town of Levan to install flow volume meters on the springs to monitor any changes that may occur. According to Mr. Jason Worwood, the Utilities Manager for the City of Levan, recorded flow rates can vary depending on the year by a factor of ten. The City of Levan and Sunroc have worked together to upgrade the Rose Bush and Tunnel Springs flow meters to establish a more accurate flow baseline. This will allow the City of Levan and Sunroc to detect immediate changes in flow rates that may be caused by mining activities. According to records from Mr. Worwood during the fall, winter, and spring Rose Bush and Tunnel Springs provide all of the culinary water for the City of Levan. During the summer a small well provides supplemental culinary water. The Utah Division of Water Rights reports that Rose Bush Spring historically produces 0.501 cubic feet per second (cfs) or approximately 225 gallons per minute (gpm) while Tunnel Spring historically produces 0.78 cfs or roughly 350 gpm (EarthFax, 2009). 225 gpm plus 350 gpm equals approximately 928 acre-feet per year. These flows were recorded prior to the flow-meter upgrade at both springs. Prior to the upgrade Mr. Worwood stated that the recorded flow rates could vary from year to year by a factor or 10.



Ground water in Juab Valley occurs in the unconsolidated basin-fill deposits. Most of the recharge to the ground water reservoir for the area occurs on the eastern side of the valley, along the Wasatch Range and San Pitch Mountains (Burden et al., 2004). Ground water moves from the higher elevations in the valley to the lower parts of the valley and to eventual discharge points at the northern and southern ends of the valley. The town of Levan is located in the southern portion of Juab Valley. Juab Valley is split into northern and southern parts by Levan Ridge, which is a gentle rise near the midpoint of the valley floor, about half way between Nephi and Levan. The southern portion of the valley drains via Chicken Creek into the Sevier River (Burden et al., 2004). Ground water occurs under both water-table and artesian conditions, with artesian being the most common in lower parts of the valley. In the alluvial fans extending from the mountains into the eastern side of the valley the greatest depths to ground water exist. “Water levels from March 1999 to March 2004 generally declined in most of Juab Valley. The decline in water levels probably resulted from continued large withdrawals and less-than-average precipitation during the irrigation season” (Burden et al., 2004). The total estimated withdrawal of water from wells in Juab Valley in 2003 was about 27,000 acre-feet, which is 2,000 acre-feet less than the amount reported for 2002 and 7,000 acre-feet more than the average annual withdrawal for 1993-2002 (Burden et. al., 2004). The water table remains high and in some locations groundwater comes to the surface in the form of springs.

Sunroc submitted an additional report (IGES, August 10 2011) to the Forest Service (at the Forest Service’s request) in August 2011 and later an addendum to the report (IGES, November 10, 2011) describing the hydrogeologic conditions in the Chicken Creek watershed and Juab Valley and the possible impacts to water resources (both developed and undeveloped) in the area resulting from the current and proposed mining operations. In their report IGES utilized the available hydrologic, geologic, geotechnical, and blast vibration data along with flow volume records from the Levan Springs water system to address concerns raised by the Forest Service.

The IGES analysis was based upon factors such as annual precipitation in the Chicken Creek watershed and in the proposed Upper West Mine area, the ratio of watershed areas to current and proposed disturbance areas, loss of infiltration due to soil compaction in disturbed areas, available evapotranspiration data, the ratio of the current volume of withdrawal by the Levan Springs water system to the estimated annual flow and estimated water budget in the Chicken Creek drainage, and the reported water balance for southern Juab Valley.

IGES concluded that some loss of ground water recharge would occur as a result of soil compaction due to heavy equipment traffic and that some ground water flow paths would be altered due to the mining methods being used but that the impacts would be minimal to the Chicken Creek watershed and Juab Valley ground water and surface water resources. Their conclusions were based upon the estimated volume of annual water losses and withdrawals compared to the total annual water volume estimates for the Chicken Creek watershed and southern Juab Valley.

Not having a comprehensive hydrogeologic analysis of the project area (with more empirical data) and a thorough understanding of the subsurface stratigraphy (and the resulting variations in



hydraulic conductivity), it is not possible to make an accurate prediction how the geological heterogeneity (together with the proposed mining operations) will affect the local and regional ground water flow systems. The affects that changing the topography through strip mining will have on the inter-relationship between recharge and discharge areas and the quantities discharged through those systems cannot be accurately predicted.

3.7.3 Impacts

3.7.3.1 Alternative One (No Action Alternative)

Under Alternative One, current approved operation plans would continue to guide the mining operation. Sunroc would continue to operate the mine, but no expansion to additional areas on the Forest would occur in the Lower West Mine, the Upper West Mine, or the East Mine. Future mining operations could only continue on private lands. Under the No Action Alternative Sunroc would not expand its mining operations on NFS lands and would only continue its operations in the previously approved mining areas.

The No Action Alternative presents no change in potential impacts to surface water or ground water resources. The current potential impacts from mining include: diminished ground water recharge, interruption of ground water and surface water flow paths, increased sediment in surface water due to surface disturbance, increased sediment and/or minerals in ground water, changes in hydrology due to seismic shifts related to blasting, and surface and ground water contamination from spills of hazardous materials onsite.

The potential for increased sediment concentration in ground water could result from the removal of vegetation during ground disturbance activities. Ground disturbance, including vegetation removal, could increase the potential for erosion, which may increase the sediment load in surface water. If that sediment load is not completely removed from surface water during infiltration into subsurface water, there could be an increase in sediment load in the ground water. Catch basins and erosion control devices would be used in accordance with the Storm water Pollution Prevention and Erosion Control Plan in order to prevent sedimentation impacts to both surface and subsurface water.

Tunnel and Rosebush springs serve as culinary water sources for the town of Levan. Concerns have been raised in the past that ground vibrations caused by blasting activities at the mine sites could adversely impact the water supply systems. Mine blasting is conducted in accordance with federal velocity and frequency standards that are set at a level to limit the potential for damage to man-made structures. Based upon a vibration monitoring study conducted during blasting operations, IGES concluded the seismic data indicated that the distance between the location of blasting operations to Tunnel and Rosebush springs was sufficient to preclude damage to their infrastructure, i.e., piping and housing. However, the discussion presented by IGES did not address possible adverse impacts to the area's hydrogeology, i.e., increased turbidity and mineral concentrations resulting from blasting operations. Only long-term data would determine if increased concentrations are caused by the blasting operations.



In addition to concerns regarding damage to the infrastructure, there are also concerns that the local hydrogeology and ground water flow paths that directly recharge Rosebush and Tunnel springs may be adversely impacted by ground movements resulting from blasting activities at the mine sites. Hydrogeologic changes resulting from blasting could involve changes in porosity, permeability, transmissivity, and increased turbidity or mineral concentration in the ground water. Ground water turbidity and mineral concentration levels go through naturally occurring cyclical changes; therefore, long-term sampling is recommended to determine the impacts to ground water resulting from the blasting operations (Jones, 2010).

Liquids such as lubrication oil, hydraulic oil, coolant fluid, diesel, and gasoline would be used at the mine site in order to operate vehicles and equipment. With the use of these chemicals there could be a risk of spills. If spills are not cleaned up appropriately, they have the potential to impact groundwater. To mitigate potential impacts from accidental spills, the mine operates under the guidance of a Spill Prevention Control and Countermeasure Plan (SPCCP) and the SWCP's and BMP's specified in **Appendix B**. Mine operations are conducted in accordance with regulations regarding spill prevention and remediation. All chemicals used for blasting would be stored offsite and would not pose a chemical spill risk at the mine.

Under this alternative mining operations would be much shorter in duration and cover a much smaller area; therefore, adverse environmental impacts would be much less under this alternative.

3.7.3.2 Alternative Two (Proposed Action)

The potential impacts to water quality and quantity from actions associated with Alternative Two would include all those associated with the No Action Alternative plus additional potential impacts resulting from the larger disturbance area and the longer period of time that mining operations would continue (up to 128 years at the East Mine). Because blasting would occur over a longer period there could be an increase in the potential for blasting to impact the hydrogeology of the area. This potential would increase over the No Action Alternative because the blasting would occur over a larger area.

The larger disturbance area and strip mining practices in water recharge zones would increase the potential to adversely impact ground water recharge and local/regional ground water and surface water flow systems.

An accurate prediction of the time period that the potential impacts to water resources would not extend beyond cannot be made for Alternative Two.

3.7.3.3 Alternative Three (Preferred Alternative)

The potential impacts to water resources under Alternative Three would be the same as the impacts associated with Alternative Two.



3.7.4 Mitigation Measures Not Included in The Plan of Operations

There are no water resource mitigation measures identified; however, as an added protection measure, due to the uncertainty of the possible impacts to water resources, in October 2011 the Forest Service requested Sunroc to install six piezometers in the Chicken Creek alluvial deposits for the purpose of monitoring water levels to help assess any possible impacts to water resources in the Chicken Creek drainage resulting from mining operations. The piezometers were to be located up gradient and down gradient of the East and West mines and near each of the spring collection systems. The piezometers were to be monitored on a quarterly basis and an annual report submitted to the Forest Service. The Town of Levan, UT objected to the installation of piezometers (Town of Levan, November 7, 2011). Their main concern was that contaminants could be introduced into the alluvial aquifer during the installation procedures and later through vandalism after the piezometers were installed. They also stated that the flow meters already installed on the spring collection systems and the quarterly water quality sampling now being performed would be sufficient to reveal any impacts to the Levan water supply system resulting from mining operations. As a result of Levan's concerns the Forest Service will not pursue the possibility of having piezometers installed in the Chicken Creek alluvium.

3.8 CUMULATIVE IMPACTS

3.8.1 Introduction

Council on Environmental Quality (CEQ) regulations require that the cumulative effects of a project be considered when evaluating potential environmental impacts for an EIS. CEQ defines cumulative effects as:

the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions (40 CFR § 1508.7).

Cumulative effects most likely arise when a relationship exists between the proposed action and other actions expected to occur in a similar location during a similar time period. The geographic boundaries considered in the cumulative effects analysis will be based on the resource being analyzed and will be discussed with each resource topic. The timeframe considered in the cumulative effects analysis is 15 to 20 years. The mine could be in operation for approximately 128 years; however, it is not reasonable to speculate on other projects that far into the future.

Actions overlapping with, or in proximity to, the proposed action are most likely to have the potential to result in cumulative effects. Applicable past, present, and reasonably foreseeable future actions are described for each resource discussed in Chapter 3.



3.8.2 Past, Present, and Reasonably Foreseeable Future Actions

The **Table of Past, Present, and Reasonably Foreseeable Future Actions** in **Appendix A** lists the projects within an approximate 12 mile radius of the Chicken Creek Mine.

3.8.2.1 Past Projects/Actions

Gypsum mining is the primary mineral mined on the Sanpete Ranger District. Gypsum mining has occurred in the area for several decades by various operators. Some exploration, prospecting, and mining for locatable minerals has occurred in the area but nothing is currently active. Other currently active mining operations occurring within the cumulative effects analysis area, both federal and non-federal, include the following:

Table 3.13
Other Active Mines/Quarries Within ~12 Miles of the Chicken Creek Mine Site

Mine/Quarry Name	Large (L) or Small (S) Mine ¹	Type of Mineral	Miles and Direction From Chicken Creek ²
Henry Mine	L	Gypsum	~3 Miles Southwest
Nephi Gypsum Quarry	L	Gypsum	~12 Miles North
HICAL #1	L	Travertine	~10 Miles Northwest
Honey Onyx	S	Travertine Onyx, Limestone	~12 Miles Northwest

¹ = A large mine is 5 acres or larger, a small mine is less than 5 acres

² = Mileage is approximate

In addition to the mining operations listed in **Table 3.12**, a search of the Forest database indicated that nine other quarries have operated within the San Pitch Mountains. None of those located within the National Forest are known to be active. The current operational status (active or inactive) of the Utah Department of Highways sand and gravel pit located at the mouth of Pigeon Creek is unknown (refer to **Appendix A**).

A comprehensive analysis of impacts to wildlife and habitat conditions within the cumulative effects analysis area has not been conducted with respect to the construction of I-15 and other road construction in the area, other types of infrastructure development and building construction, added human population, farming practices, and water diversions that have occurred over the past many decades.

3.8.2.2 Present Projects/Actions

The mines listed in **Table 3.13** are active and would be considered a present action. Other present actions include recreation on the Manti-La Sal National Forest located just east of the Project Area. These activities include camping at a small/primitive campground about two miles away, hiking on nearby trails, and snowmobiling and ATV use on NFSR 50101. Barnes Bullets has relocated from Lindon, Utah to Nephi. They employ approximately 60 to 65 people.



3.8.2.3 Reasonably Foreseeable Future Projects/Actions

Business Development Projections

- A multi-million dollar rail-served industrial park is planned to be developed four miles west of Levan and one mile north of the Mona/Levan I-15 interchange. This industrial park would house 15 to 20 businesses and eventually supply approximately 1,100 jobs.
- A dairy drying facility is in the process of relocating from Boise, Idaho to Nephi. They have secured the property for relocating their headquarters and factory.
- FiberTEK Insulation opened in Nephi in June 2010 and employs approximately 100 people.

Mining is likely to continue through the cumulative effects timeframe of 15 to 20 years at the sites listed in **Table 3.12**.

3.8.3 Inventoried Roadless Areas and Unroaded and Undeveloped Areas

The cumulative effects analysis area for the IRA and Unroaded and Undeveloped Areas includes both the Levan Peak IRA and the Draft Levan Peak Unroaded/Undeveloped Area. There are no additional projects currently proposed within the IRAs. There will likely be continued maintenance at the Levan Peak communications site, but this maintenance should not cause any additional impacts within the area. It is unlikely; however, that they would have any permanent long-term impacts. The reclamation of the mine site over the lifetime of the mine would likely decrease any impacts from mining activities. There are no anticipated measurable cumulative effects in addition to the proposed action of this document.

3.8.4 Wildlife

The cumulative effects analysis area for the proposed project is defined as all land within a 12-mile radius around the proposed mine expansion site. This area was identified because it gives a good cross section of all habitats that may be present within the Project Area. There are many species of wildlife that use the Chicken Creek Mine area for habitat, forage, and breeding. Section 3.5 describes existing conditions for wildlife within the study area.

The potential cumulative effect of continuing mining in the area is fragmentation of wildlife habitat or direct habitat loss. There are 4 other mines located within 12 miles of this mine. The mining activities at the other 4 mine sites have likely caused habitat loss and fragmentation. However, because the mines are spread out on the landscape they are not creating one large area of habitat fragmentation or habitat loss, and there are large areas of habitat available between these mines.

Construction of new haul roads can also fragment or destroy habitat. In the case of the proposed action, which would add additional haul roads outside of the existing mine sites and add a new pit location, impacts to habitat will be limited to these areas. Mining activities near wildlife habitat could result in mortalities from machinery and temporary displacement of wildlife populations.



The small added effect of this mine expansion, in combination with past (I-15 and other road construction, other types of infrastructure development and buildings, added human population, farming practices, water diversions, and resultant effects to wetland areas and other habitats for all wildlife species), present and future actions will add incrementally to the already adverse effect on wildlife.

3.8.5 Terrestrial and Aquatic Threatened, Endangered, Sensitive, Management Indicator Species, and Migratory Birds

The cumulative effects analysis area for the proposed project is defined as all land within a 20-mile radius around the proposed mine expansion site. This area was chosen because peregrine falcons may forage up to 18 miles from their nests, thus land within this area may contain foraging habitat for falcons. The foraging radii for the other species addressed in this document are smaller, thus this analysis area encompasses all species. Only species that may be directly or indirectly impacted from the proposed project, as discussed in Sections 3.3 and 3.4, are discussed in the cumulative effects analysis.

Mining activities in the cumulative effects analysis area have the potential to impact peregrine falcons and wintering and migrating bald eagles through disturbance (noise from blasting and equipment and human presence) and/or removal of foraging habitat. These impacts could add cumulatively to the potential impacts from the proposed project on these species. Mining activities in the cumulative effects analysis area have the potential to impact roosting habitat and the insect prey base of spotted bats and Townsend's big eared bats, primarily through blasting and removal of vegetation. These impacts could add cumulatively to the potential impacts from the proposed project on these species.

Business development proposed in the town of Nephi is not anticipated to generate cumulative impacts to Sensitive Species due to the urban and developed nature of this town. The industrial park planned west of Levan and the proposed railroad track from Salina north to Juab would both be built on currently undeveloped land. If this land contains suitable habitat for the bald eagle, peregrine falcon, spotted bat, and Townsend's big-eared bat, then impacts to these species could result from the removal of habitat, increase in human presence and noise, and changes in land use. These impacts could add cumulatively to the potential impacts resulting from the proposed mine expansion.

3.8.6 Visual Resources

The cumulative effects analysis area for visual resources is a 12 mile buffer around Chicken Creek. This will allow for a discussion of visual impacts caused by the other mines operating within a 12 mile area.

The San Pitch Mountains have been the site of numerous gypsum mines over the years. The Henry Mine is located about 5 miles south of the Chicken Creek mine and is currently proposing to continue operations in the mine. There is another inactive gypsum mine located in Nephi Canyon about 12 miles to the north which has been reclaimed, but with debatable success.



Residents of the Juab Valley are accustomed to the site of open pit mines throughout the area, and particularly Chicken Creek. Although the East Mine proposes to expand onto NFS land, its existing size and dominance of the adjacent private land make it readily apparent to travelers along the Chicken Creek Scenic Backway. The Chicken Creek Mine can currently be seen as far away as I-15 to the west as can the Henry Mine. If the proposed Upper West Mine is opened to mining this area will also be visible from I-15 and when passing through the town of Levan. None of the other mines are readily visible from Levan.

Only the Chicken Creek East and West Mines are visible within Chicken Creek Canyon; none of the other existing mines can be seen from the canyon. A person cannot currently see any of the mines from the Forest's Chicken Creek Campground located approximately 2.5 miles east of the East Mine. If Sunroc moves forward with the mine expansion as proposed the mining operations would still not be visible from the campground.

There are no other cumulative impacts identified other than the direct and indirect impacts discussed in Section 3.5 for visual resources.

3.8.7 Socioeconomics

The cumulative effects analysis area for social and economic resources is Juab County. Juab County had an estimated population of 9,604 in 2007 (City-data, 2009c). Fifty-five percent of the Juab County population lived in an urban environment and 45 percent lived in a rural environment. The average household size was 3.3 persons. The racial profile of the county consisted of the following: White Non-Hispanic (95.8 percent), Hispanic (2.6 percent), American Indian (1.5 percent), two or more races (1.0 percent) and other races (0.9 percent) (City-data, 2009c).

In 2007 Juab County labor force was 4,063 and there was a 3.2 percent unemployment rate (Census, 2009d). Thirty-two of those employed in 2000 were employed in the mining industry (Census, 2009e). That was one percent of the employed population throughout the county. The highest employment industries in Juab County in 2000 were manufacturing, educational, health, and social services, retail trade, accommodations and food services, and construction (Census, 2009e).

Barnes Bullets has relocated from Lindon to Nephi, creating 60-65 jobs (Woodland, 2009). Projected business development in the county includes a short line railroad from Salina to Juab to provide a spur to a loading facility that would support SUFCO Mine and several businesses in Sevier County including Redmond Mining and Salt. Also, there are very preliminary plans to relocate a dairy drying facility from Boise to Nephi which would create an unknown number of jobs. There are also plans for the development of a fibertech insulation company in Nephi which would create approximately 100 jobs (Woodland, 2009).

Considering the projected economic growth, the mining industry does not have a large social or economic cumulative effect for Juab County. Therefore, there are no measurable cumulative effects of the mine and other activities on social and economic resources.



3.8.8 Water Resources

Ground Water Cumulative Effects Analysis

The cumulative effects analysis takes into consideration potential ground water effects occurring from activities associated with the Chicken Creek Mine and other mines and projects within the cumulative effects analysis area, listed in **Table 3.12** and **Appendix A**. Cumulative effects most likely arise when a relationship exists between proposed action and other actions expected to occur in a similar location during a similar time period. Cumulative effects to groundwater would occur if these mines significantly altered ground water quality within a watershed. All of the mines within the cumulative effects analysis area are subject to state and federal water quality regulations and are required to comply with water discharge permits. Also, the mines in this area are located within different watersheds than the Chicken Creek Mine so they are unlikely to impact the Chicken Creek watershed, but could impact the water resources in Juab Valley.

Each mine has the potential to discharge contamination into surface and ground water and is therefore required to obtain state and federal permits and abide by Utah Administrative Code R317-6-6.2. As stated in the Utah Administrative Code, “The general ground water protection levels that permit compliance would require include the following guidance: 1) When a contaminant is not present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 0.1 times the groundwater quality standard value, or the limit of detection, and 2) When a contaminant is present in a detectable amount as a background concentration, the concentration of the pollutant may not exceed the greater of 1.25 times the background concentration, 0.25 times the groundwater quality standard, or background plus two standard deviations; however, in no case will the concentration of a pollutant be allowed to exceed the ground water quality standard” (Utah Administrative Code R317-6-4). There is more specific guidance depending on the use classification of the ground water body. For example, there is different guidance depending on if the ground water is used for drinking water or agricultural uses.

The Chicken Creek Mine is the only active mine within the Chicken Creek drainage and is the one most likely to have the potential to impact ground water controlled by the local flow system within the Chicken Creek watershed. The other active mines are located outside of the Chicken Creek watershed and would not affect the localized ground water system; however, the regional ground water flow system to Juab Valley could be impacted by the other active and inactive mining operations that are located in recharge areas contributing ground water (either by local or regional ground water systems) to Juab Valley.

As stated above, in Section 3.7.2, mining operations at the Chicken Creek Mine are likely to result in loss of ground water recharge and alteration of ground water flow paths. These impacts are predicted to be minimal based upon the ratio of estimated loss of recharge to the total ground water budgets for the Juab Valley and the Chicken Creek watersheds. However, all of the mining operations taken together (as well as the other industrial operations in the region) will have greater cumulative impacts to ground water within the Cumulative Effects Analysis area.



Surface Water Cumulative Effects Analysis

Section 303 of the Clean Water Act directs each state to establish water quality standards to protect beneficial uses of surface water resources (beneficial use and stream classification is outlined in the Utah Administrative Code for Surface Water R317-2). The Clean Water Act also requires states to monitor water quality to assess achievement of these standards and impairment by pollutants. Where water quality is found to be impaired, each state must then establish a total maximum daily load (TMDL) for each pollutant that contributes to the impairment. A TMDL sets limits on pollution sources and outlines how these limits will be met through implementation of best available technologies for point sources and best management practices for nonpoint sources. The Chicken Creek stream segment located near the mine, including the springs, at the time of this writing, is not impaired under Section 303 of the Clean Water Act.

The cumulative effects analysis takes into consideration potential surface water effects occurring from activities associated with the Chicken Creek Mine and the mines within the cumulative effects analysis area, listed in **Table 3.12** and **Appendix A**. The Chicken Creek Mine is the only mine located within the Chicken Creek drainage with potential to impact the surface water localized in this watershed. However, as the surface disturbance associated with mining increases (and is not successfully reclaimed) surface water-related impacts could incrementally accrue inside the Cumulative Effects Analysis boundary. Since the other active mines are located outside of the watershed area, they are not likely to impact the same surface water- groundwater body as the Chicken Creek Mine. Therefore, based on the known affected environment and environmental consequences of the Proposed Action the cumulative effects analysis relative to the Proposed Action indicates that, at this time, the incremental effects, coupled with other existing and planned land uses on wildlife habitats/species, vegetation, recreation, groundwater, and soils, could be mitigated or reduced over time, depending on recovery time, adequate precipitation, and reclamation success, using the stipulations, erosion control practices, i.e., SWCPs & BMPs (see **Appendix B**), and mitigation and monitoring measures as outlined in the Plan.



CHAPTER 4 – CONSULTATION AND COORDINATION

4.0 INTRODUCTION

This chapter describes the consultation and coordination that occurred with federal, state and local agencies, private citizens and citizen groups during the preparation of the EIS.

4.1 DOCUMENT CONSULTATION AND COORDINATION

The Forest Service coordinated with the following individuals, federal, state, and local agencies, Tribes and non-Forest Service persons during the development of this EIS:

4.1.1 Federal, State, and Local Agencies

- United States Environmental Protection Agency (EPA) Region VIII
- Utah Division of Water Quality
- Utah Farm Bureau
- Utah Cattlemen's Association
- Juab County Commissioners
- Utah Division of Wildlife Resources
- Mayor of the City of Levan
- Mayor of the City of Nephi
- Utah Division of Oil, Gas, and Mining
- U.S. Fish and Wildlife Service
- Bureau of Land Management, Utah State Office, Solid Minerals
- Southeastern Utah Association of Governments

4.1.2 Tribes

- Paiute Indian Tribe of Utah
- Ute Indian Tribe
- Hopi Tribe

4.1.3 Others

- Utah Environmental Congress (UEC)
- Levan Land Company
- David and Robert Shepard
- Grand Canyon Trust
- Levan Irrigation Company

4.2 DISTRIBUTION OF THE EIS

Notification of availability of this EIS has been provided to the federal agencies, state and local governments, Tribes, organizations, and individuals listed in Section 4.1.



CHAPTER 5 – PREPARERS AND CONTRIBUTORS

The following Interdisciplinary (ID) Team members contributed to the preparation of this EIS:

USDA Forest Service

<u>Name</u>	<u>Responsibility</u>
Karl Boyer	Geology, Minerals, Ground Water
Jeff Jewkes	Wildlife Biology
Don Wilcox	Engineering
Karlton Moss	Range
Robert Davidson	Soils/Reclamation Techniques
Jan Curtis-Tollestrup	Surface Water
Jed Hancock	Recreation
Pete Kilbourne	Visual Quality
Nate Lewis	Visual Quality
Charmaine Thompson	Cultural Resources

URS (Consultant)

<u>Name</u>	<u>Responsibility</u>
Valerie Porter	Consultant Project Manager, Environmental Lead, Cumulative Impacts
Laura Springsteen	Socioeconomics, Environmental Justice, Water Quality
Kavi Koleini	Visual Resources
Leslie Watson	Inventoried Roadless Areas (IRAs)/Unroaded and Undeveloped Areas
Rebecca Thompson	Wildlife, Threatened, Endangered, and Sensitive Species, Migratory Birds
Matt Cambier	Wildlife, Threatened, Endangered, and Sensitive Species, Migratory Birds
Johanna Tietze	Wildlife, Threatened, Endangered, and Sensitive Species, Migratory Birds



CHAPTER 6 –REFERENCES

- Auby, W.L. (1991). Provisional Geologic Map of the Levan Quadrangle, Juab County, Utah: Utah Geological Survey Map 135, Scale 1:24,000.
- Balda, Russel P. (2002). Pinyon Jay (*Gymnorhinus cyanocephalus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/605> doi:10.2173/bna.605.
- Beck, D. L. (1980). *Wintering Bald Eagles in the Wells Resource Area, Elko District, Nevada, 1970-1980*. U.S Department of the Interior, Bureau of Land Management.
- Bond, F.M., G. R. Craig, J. H. Enderson, A. W. Heggen, J. V. Kussman, D. L. Wills, A. Jenkins, and J. P. Hubbard. (1984). *American Peregrine Falcon: Rocky Mountain and Southwest Population Recovery Plan*. U.S. Fish and Wildlife Service, Denver, Colorado.
- Bosworth, W. R. III. (2003). *Vertebrate Information Compiled by the Utah Natural Heritage Program: A Progress Report*. Utah Division of Wildlife Resources, Salt Lake City, Utah. UDWR Publication No. 03-45
- Brown, C. G. (1992). *Movement and Migration Patterns of Mule Deer in Southeastern Idaho*. Journal of Wildlife Management. 56(2):246-253.
- Burden, C.B. (2004). *Groundwater Conditions in Utah, Spring of 2004*. Cooperative Investigations Report No. 45. Prepared by the U.S. Geological Survey in cooperation with: the Utah Department of Natural Resources, Division of Water Resources and Division of Water Rights. p 46.
- Calder, William A., and Lorene L. Calder. (1992). Broad-tailed Hummingbird (*Selasphorus platycercus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North American Online: <http://bna.birds.cornell.edu/bna/species/016doi:10.2173/bna.16>.
- City-data. (2009a). City-data website accessed on September 30, 2009 for information on the town of Levan, Utah. Retrieved from: <http://www.city-data.com/city/Levan-Utah.html>
- City-data. (2009b). City-data website accessed on September 30, 2009 for information on Nephi, Utah. Retrieved from: <http://www.city-data.com/city/Nephi-Utah.html>
- City-data. (2009c). City-data website accessed on September 30, 2009 for information on Juab County, Utah. Retrieved from: http://www.city-data.com/county/Juab_County-UT.html



- Comprehensive Wildlife Conservation Strategy [CWCS]. (2005). *Utah Comprehensive Wildlife Conservation Strategy*. Utah Division of Wildlife Resources, Salt Lake City, Utah. UDWR Publication No. 05-19.
- EarthFax. (2012). *Notice of Intention to Commence Large Mining Operations at the Chicken Creek Mine*. Prepared for Sunroc Corporation, Chicken Creek Mine, Levan, Utah.
- Earthtouch. (2005) – *A Cultural Resource Inventory of the Chicken Creek and Henry Gypsum Mines, in the San Pitch Mountains, Near Levan, Uinta National Forest, Juab County, Utah*. EarthTouch Cultural Resource Rpt. No. 05-06. Prepared by Scott Billat for Clyde Companies Inc., 252 West Center Street, Orem, Utah.
- Ehrlich, P. R., D. S. Dobkin, and D. Wheye. (1988). *The Birder's Handbook: A Field Guide to the Natural History of North American Birds*. Simon and Schuster/Fireside Books, New York.
- Farmer, C. J., L. J. Goodrich, E. Ruelas Inzunza, and J. P. Smith. (2007). *Conservation Status Report: Golden Eagle. Hawk Mountain Sanctuary, Kempton, Pennsylvania, USA*. Retrieved from: http://hawkmountain.org/media/GoldeneagleCSR_June07.pdf Accessed in December 2008.
- Fertig, W., R. Black, and P. Wolken. (2005). *Rangewide Status Review of Ute Ladies'-Tresses (Spiranthes diluvialis)*. Prepared for the U.S. Fish and Wildlife Service and Central Utah Water Conservancy District. 30 September.
- Franklin, B. (2005). *Department of Natural Resources; Division of Wildlife Resources; Utah Natural Heritage Program. Plant Information Compiled by the Utah Natural Heritage Program*. Publication Number 05-40. Page 185. Species: Ute Ladies'-Tresses.
- Fyfe, R.W., and R.R. Olendorff. (1976). *Minimizing the dangers of nesting studies to raptors and other sensitive species*. Occasional Paper No. 23, Canadian Wildlife Service, Ottawa. 16 pp.
- Hoover, R. L. and D. L. Willis. (1987). *Managing Forested Lands for Wildlife*. Colorado Division of Wildlife in cooperation with USDA Forest Service, Rocky Mountain Region, Denver, Colorado.
- IGES (August 10, 2011). *Hydrogeology Report and Response to US Forest Service Request, Levan Chicken Creek Mine, Levan, Juab County, Utah*. Prepared by Sheila Kluck for Sunroc Corporation, 730 North 1500 West, Orem, Utah 84507.
- IGES (November 10, 2011). *Response to US Forest Service Comments, Levan Chicken Creek Mine Hydrogeology Report – Addendum, Juab County, Utah*. Prepared by Sheila Kluck for Sunroc Corporation, 730 North 1500 West, Orem, Utah 84507.



- Jones. (2010). Contact Report Form. URS Corporation.
- Larsen, E., J. M. Azerrad, N. Nordstrom, editors. (2004). *Management Recommendations for Washington's Priority Species, Volume IV: Birds*. pp 7-1. Washington Department of Fish and Wildlife, Olympia, Washington, USA.
- Legacy. (2005). *Legacy Parkway Wildlife Impacts Analysis Technical Memorandum*. Prepared for the Federal Highway Administration and the U.S. Army Corps of Engineers. Prepared by Jones and Stokes Associates, now part of ICF International. This document can be requested from the Utah Department of Transportation, Environmental Group.
- Licht, L.E. (1986). *Food and Feeding Behavior of Sympatric Red-legged Frogs, Rana aurora, and Spotted Frogs, Rana pretiosa, in Southwestern British Columbia*. The Canadian Field-Naturalist, 100(1):22-31.
- Manti-La Sal National Forest [MLSNF]. (2005). GIS Coverage of Vegetation of the Manti & San Pitch Divisions of the Manti-La Sal National Forest. Updated Fall, 2005. Manti-La Sal National Forest, Price, Utah.
- NatureServe. (2011). NatureServe Explorer, An Online Encyclopedia of Life [web application]. Version 6.1. NatureServe, Arlington, Virginia. Retrieved from: <http://www.natureserve.org/explorer>. (Accessed: 2011).
- Oliver, G. V. (2000). *The Bats of Utah: A Literature Review*. Utah Division of Wildlife Resources, Salt Lake City, Utah. UDWR Publication No. 00-14.
- Parrish, J. R., F. P. Howe, and R. E. Norvell. (2002). *Utah Partners in Flight Avian Conservation Strategy Version 2.0*. Utah Partners in Flight Program, Utah Division of Wildlife Resources, Salt Lake City, Utah. UDWR Publication No. 02-27.
- Romin, L. A., and J. A. Muck. (2002). *Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances*. U.S. Fish and Wildlife Service, Utah Field Office, Salt Lake City, Utah. January 2002 update.
- Sauer, J. R., J. E. Hines, and J. Fallon. K. L. Pardieck, D. J. Ziolkowski, Jr., and W. A. Link. (2011). *The North American Breeding Bird Survey, Results and Analysis 1966 – 2009. Version 3.23.2011*. USGS Patuxent Wildlife Research Center, Laurel, Maryland.
- Spahr, R., L. Armstrong, D. Atwood, and M. Rath. (1991). *Threatened, Endangered and Sensitive Species of the Intermountain Region*. USDA Forest Service, Ogden, Utah.
- Streubel, John. (2000). Digital Atlas of Idaho: Mammals. Retrieved from: <http://imnh.isu.edu/digitalatlas/bio/mammal/mamfram.htm>. Accessed in 2011.



- Sunroc. (2009). *Notice of Intention to Commence Large Mining Operations at the Chicken Creek Mine (the Plan)*. Prepared by EarthFax Engineering, Inc. Midvale, Utah. May 2009.
- Sutter, J.V., M.E. Andersen, K.D. Bunnell, M.F. Canning, A.G. Clark, D.E. Dolsen, and F.P. Howe. (2005). *Utah Comprehensive Wildlife Conservation Strategy*. Publication number 05-19. State of Utah; Natural Resources Division of Wildlife Resources.
- Thomas, J. W., H. Black, R. J. Scherzinger, and R. J. Pedersen. (1979). *Wildlife Habitats in Managed Forest: The Blue Mountains of Oregon and Washington – Chapter Eight*. USDA Forest Service, Agricultural Handbook 553.
- Toone, R. A. (1994). *General Inventory for Bats in the Abajo and La-Sal Mountains, Manti-La Sal National Forest, Utah, with Emphasis on Spotted Bats (Euderma maculatum) and the Townsend's Big-eared Bats (Plecotus townsendii)*.
- United States Census Bureau [Census]. (2009a). American FactFinder website accessed on September 30, 2009 for information on Levan, Utah median household income. Retrieved from: http://factfinder.census.gov/servlet/DTTable?_bm=y&-state=dt&-context=dt&-ds_name=DEC_2000_SF3_U&-mt_name=DEC_2000_SF3_U_P053&-tree_id=403&-all_geo_types=N&-caller=geoselect&-geo_id=16000US4944650&-geo_id=16000US4954220&-search_results=01000US&-format=&-lang=en
- United States Census Bureau [Census]. (2009b). American FactFinder website accessed on September 30, 2009 for information on Juab County, Utah median household income. Retrieved from: http://factfinder.census.gov/servlet/DTTable?_bm=y&-state=dt&-context=dt&-ds_name=DEC_2000_SF3_U&-mt_name=DEC_2000_SF3_U_P053&-tree_id=403&-redoLog=true&-all_geo_types=N&-caller=geoselect&-geo_id=05000US49023&-search_results=04000US49&-format=&-lang=en
- United States Census Bureau [Census]. (2009c). American FactFinder website accessed on September 30, 2009 for information on the state of Utah median household income. Retrieved from: http://factfinder.census.gov/servlet/DTTable?_bm=y&-state=dt&-context=dt&-ds_name=DEC_2000_SF3_U&-mt_name=DEC_2000_SF3_U_P053&-tree_id=403&-redoLog=true&-all_geo_types=N&-caller=geoselect&-geo_id=04000US49&-search_results=16000US4954220&-format=&-lang=en
- United States Census Bureau [Census]. (2009d). American FactFinder website accessed on September 30, 2009 for information on Nephi, Utah employment in 2000. Retrieved from: http://factfinder.census.gov/servlet/QTTable?_bm=y&-state=qt&-context=qt&-qr_name=DEC_2000_SF3_U_DP3&-ds_name=DEC_2000_SF3_U&-tree_id=403&-all_geo_types=N&-caller=geoselect&-geo_id=16000US4954220&-search_results=01000US&-format=&-lang=en



- United States Census Bureau [Census]. (2009e). American FactFinder website accessed on October 8, 2009 for information on industry information for Juab County in 2000. Retrieved from: http://factfinder.census.gov/servlet/QTTable?_bm=y&-state=qt&-context=qt&-qr_name=DEC_2000_SF3_U_QTP29&-ds_name=DEC_2000_SF3_U&-tree_id=403&-all_geo_types=N&-caller=geoselect&-geo_id=05000US49023&-search_results=01000US&-format=&-lang=en
- United States Department of Agriculture [USDA]. (1986). *Manti-La Sal National Forest Land and Resource Management Plan*. Manti-La Sal National Forest, Price, Utah.
- United States Department of Agriculture [USDA]. (2004). *Intermountain Region Planning Desk Guide: A Protocol for Identifying and Evaluating Areas for Potential Wilderness*
- United States Department of Agriculture [USDA]. (2006). *Manti-La Sal National Forest Land and Resource Management Plan: Forest Plan Amendment*. Manti-La Sal National Forest, Price, Utah.
- United States Fish and Wildlife Service [USFWS]. (2008). *Birds of Conservation Concern*, Division of Migratory Bird Management, Arlington, Virginia.
- United States Fish and Wildlife Service [USFWS]. (2007a). *Removing the Bald Eagle in the Lower 48 states from the list of Endangered and Threatened Wildlife*. Federal Register Vol. 72, No. 37346pp.
- United States Fish and Wildlife Service [USFWS]. (2007). *Endangered and Threatened Wildlife and Plants; 90-Day Finding on a Petition to Reclassify the Utah Prairie Dog From Threatened to Endangered and Initiation of a 5-Year Review*. Federal Register Vol. 72, No. (34): 7843-7852.
- United States Fish and Wildlife Service [USFWS]. (2011). U.S. Fish and Wildlife Service Federally listed and proposed, endangered, threatened, experimental, and candidate species and habitat in Utah by county updated June, 2011.
- United States Forest Service [USFS]. (1991). *Decision Notice and Finding of No Significant Impact, Security 1 thru 4 Mining Claims Plan of Operations*. Manti-La Sal National Forest, Price, Utah. January 11, 1991.
- United States Forest Service [USFS]. (2002). *Environmental Assessment of Davis 3 & 4 Mining Claims, Chicken Creek Gypsum Mine, Plan of Operations*. Intermountain Region, Manti-La Sal National Forest, San Pete Ranger District, Juab County, Utah.
- United States Forest Service [USFS]. (2005). GIS Coverage of Vegetation of the Manti and San Pitch Divisions of the Manti-La Sal National Forest. Updated Fall, 2005. Manti-La Sal National Forest, Price, Utah.



- United States Forest Service [USFS]. (2008). Forest GIS Data; Manti-La Sal National Forest; Big Game Winter Range.
- United States Forest Service [USFS]. (2010). Manti-La Sal Golden Eagle Nest Monitoring Data. Jeff Jewkes. Manti-La Sal National Forest, Price, Utah.
- United States Forest Service [USFS]. (2011). *Biological Assessment and Biological Evaluation for the SunRoc Corporation's Proposed Supplement to the Plan of Operations for SunRoc Chicken Creek Gypsum Mine*. Prepared by Manti-La Sal National Forest.
- United States Geological Survey [USGS]. (2012). Breeding Bird Survey data. Retrieved from: <http://www.pwrc.usgs.gov/BBS/results/routemaps/routeMapStatic.html>; <http://pwrc.usgs.gov/BBS/PublicDataInterface/index.cfm>; <http://pwrc.usgs.gov/BBS/results/routemaps/routeAssignMap.cfm>; <http://mbr-pwrc.usgs.gov/bbs/bbs.html>. Accessed March 2012.
- Utah Department of Natural Resources [UDNR]. (2006). *Columbia Spotted Frog (Rana luteiventris) – Monitoring Summary, Central and Northern Regions*. State of Utah, Department of Natural Resources, Division of Wildlife Resources – Native Aquatic Species.
- Utah Department of Natural Resources [UDNR]. (2011). Utah Department of Natural Resources, Division of Wildlife Resources. Utah Conservation Data Center (UCDC). Bald Eagle, Bonneville Cutthroat Trout, Columbia River Spotted Frog, Western Boreal Toad, Desert Bighorn Sheep, Rocky Mountain Bighorn Sheep, Townsend's Big-Eared Bat, Utah Prairie Dog, and Ute Ladies'-Tresses. Retrieved from: <http://dwrucdc.nr.utah.gov/ucdc/default.asp>.
- Utah Division of Oil, Gas and Mining [DOGM]. (2000). *The Practical Guide to Reclamation in Utah*. Retrieved from: http://fs.ogm.utah.gov/pub/MINES/Coal_Related/RecMan/Reclamation_Manual.pdf
- Utah Division of Wildlife Resources [UDWR]. (2003). *Utah Division of Wildlife Resources Statewide Management Plan for Mule Deer*. State of Utah Department of Natural Resources, Salt Lake City, Utah.
- Utah Division of Wildlife Resources [UDWR]. (2008). UDWR Mammal Habitat Geographic Information System (GIS) Coverages for Elk Habitat and Mule Deer Habitat. Utah Department of Natural Resources. Retrieved from: <http://dwrucdc.nr.utah.gov/ucdc/DownloadGIS/disclaim.htm>.
- Utah Division of Wildlife Resources [UDWR]. (2009a). *Wildlife Notebook Series No. 3, Bald Eagle*. Project WILD, Utah Division of Wildlife Resources. Salt Lake City, Utah. 3p.



- Utah Division of Wildlife Resources [UDWR]. (2011). GIS Data. Species: Greater sage grouse.
- Wai-Ping, V. and M. B. Fenton. (1989). *Ecology of Spotted Bat (Euderma maculatum): Roosting and Foraging Behavior*. Journal of Mammalogy. 70(3):617-622.
- Woodland, Byron. (2009). Notes from a telephone conversation between Byron Woodland (Juab County Director of Business Development: 435-623-3415) and Laura Springsteen (URS Environmental Planner) on February 11, 2009.



CHAPTER 7 COMMENTS AND RESPONSES

7.0 INTRODUCTION

This chapter presents the Forest's responses to comments received during initial project scoping and on the Draft Environmental Impact Statement (DEIS). The Forest received three comment letters in response to initial project scoping. The comment letters were received from the Utah Environmental Congress (UEC), the National Park Service (NPS), and the Environmental Protection Agency (EPA). Two letters were received on the DEIS, one from the U.S. Department of the Interior (U. S. Geological Survey) and the other from the U.S. Environmental Protection Agency, Region 8. The responses to the comments are presented below in Sections 7.1 and 7.2, followed by the comment letters, in their entirety, in Section 7.3.

7.1 Responses to Comments Received During Project Scoping

This section presents the Forest's responses to comments received during initial project scoping.

7.1.1 National Park Service

1. *The National Park Service has no comments on:*

ER-08/0805 – Sunroc Gypsum Surface Mine Plan of Operation, Manti-La Sal.

Response: No response required.

7.1.2 U.S. Environmental Protection Agency

1. *Revegetation and reclaiming of the road to pre-development conditions should be included in the post operation reclamation plans.*

Response: Roads constructed in the pit areas will be mined through during mining operations; these areas will be reclaimed as part of the pit reclamation. All other roads, including the Upper West Mine Access Road, will be reclaimed following mining. Reclamation will include ripping or disking the road surface, recontouring to blend the road into the surrounding topography, and reseeding.

2. *Consider buffer zones for ancillary facilities like equipment staging areas if these are not considered in the OSM permit.*

Response: At the West Mine, most ancillary facilities including office buildings, conveyor belt, fuel storage tank, and parking areas will be located at the previously mined out area on



Chapter 7 – Comments and Responses

private land (outside the proposed expansion areas) near the Chicken Creek Canyon road. A rock crusher will be located at the Lower West Mine. The Lower and Upper West Mines (the proposed expansion areas) will also have portable toilet facilities on site.

At the East Mine a rock crusher, front-end loader, product stockpile, parking area, and portable toilet facilities are planned for the flat ground surface in the mined out area. No other facilities exist at the East Mine.

- 3.** *Use of road dust suppressants is critical for air and water impacts. No chemical dust suppressants should be used within a buffer zone of navigable waters. Speed zones are often not obeyed.*

Response: Water is used to control dust on all pit and facility access roads on site; no chemicals are used. There are no navigable waters near the site.

- 4.** *Consider whether upstream and downstream monitoring of dissolved and suspended solids is needed and possibly selenium. In addition, sampling of macro-invertebrate communities upstream and downstream would provide a baseline for pre-expansion stream biology.*

Response: Levan's public water supply, including Tunnel Spring and Rosebush Spring, operates under a state compliant Drinking Water Source Protection Plan. Both springs are periodically sampled for a wide range of parameters including dissolved and suspended solids, inorganic chemicals, organic chemicals, metals (including selenium), volatile organic chemicals, and radionuclides. No levels above acceptable standards have been detected for any of the analytes tested. In order to mitigate some of the uncertainty associated with mining associated impacts to water resources the Forest made an effort to have piezometers installed in the Chicken Creek alluvium. As stated in Section 3.7.4, page 3-68: "As an added protection measure, due to the uncertainty of the possible impacts to water resources, in October 2011 the Forest Service requested Sunroc to install six piezometers in the Chicken Creek alluvial deposits for the purpose of monitoring water levels to help assess any possible impacts to water resources in the Chicken Creek drainage resulting from mining operations. The piezometers were to be located up gradient and down gradient of the East and West mines and near each of the spring collection systems. The piezometers were to be monitored on a quarterly basis and an annual report submitted to the Forest Service." The Town of Levan, UT objected to the installation of piezometers primarily out of fear that they would be vandalized and contaminants introduced into the town's drinking water system. The Forest decided not to pursue the matter any further. It should be noted that the springs are located on private property.

There is a baseline macro-invertebrate monitoring site on Chicken Creek near the project area. Samples were collected in 2009; the results were analyzed by the UDWQ and the O/E percentages determined. O is the number of species predicted and E is the number of taxa present. Those results are compared to standards within the Forest Plan. Chicken Creek is meeting Forest Plan standards.



Chapter 7 – Comments and Responses

5. *Considering the expansion is five times the existing surface area, consider increased erosion control measures to protect the streams in the area. Erosion modeling should inform the need accordingly.*

Response: Drainage control features were designed based upon the results of a hydraulic analysis that evaluated the runoff characteristics for three different storm events. The drainage control features were designed to handle the larger disturbed area of the proposed mine. Runoff control channels will direct water away from all operational areas and roads to sedimentation ponds at the East and West Mines. The sedimentation ponds have been designed to accommodate the sediment yield from all pit areas during operational conditions. Erosion volumes were calculated using the Universal Soil Loss Equation modified for use in Utah. Sedimentation ponds are designed to retain runoff from a 10-year, 24-hour rainfall event and from a 100-year, 30-minute rainfall event. Channels are designed to handle runoff from a 100-year, 30-minute storm. Sedimentation pond spillways are designed to safely convey runoff from a 10-year, 24-hour rainfall event followed by a 25-year, 6-hour event.

6. *If DEIS dust/air modeling indicates significant impacts will occur during operation and mitigation is necessary, please feel free to discuss with our air experts prior to finalization of the DEIS.*

Response: The mine currently works under an air quality permit that limits production to 150,000 tons of gypsum ore per year. The same production limit will remain in effect after the expansion; therefore, no changes in air quality are expected.

7. *There are no new source performance standards for gypsum mines. The following standards would apply to the NPDES permit.*

§ 436.52 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

Except as provided in §§125.30 through 125.32, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT):

- (a) For operations not employing wet air emissions control scrubbers there shall be no discharge of process generated waste water pollutants into navigable waters.*
- (b) Only that volume of water resulting from precipitation that exceeds the maximum safe surge capacity of a process waste water impoundment may be discharged from that impoundment. The height difference between the maximum safe surge capacity level and the normal operating level must be greater than the inches of rain representing the 10-year, 24-hour rainfall event as established by the National Climatic Center, National Oceanic and Atmospheric Administration for the locality in which such impoundment is located.*
[40 FR 48657, Oct. 16, 1975, as amended at 60 FR 33967]

** Please include all Best Management Practices that will be used, especially those for*



erosion control, in the Draft EIS.

Response: The Chicken Creek Gypsum Mine is not currently working under a NPDES permit. The state of Utah has been given primacy in the issuance of such permits and has not issued a UPDES (Utah Pollutant Discharge Elimination System) permit for the mine (personal communication with Tom Munson, Utah Department of Oil, Gas, and Mining, 7/30/2012).

- a) The East Mine and Lower West Mine are located in the Chicken Creek watershed while the proposed Upper West Mine will be located in the Rock Hollow drainage (a tributary to Chicken Creek). Neither of these drainages fall under the definition of navigable waters as provided in 33 CFR, §§ 329.1 through 329.16. Both drainages are covered by the definition of waters of the United States as provided in 33 CFR, §§ 328.1 through 328.5. The retention ponds at both the East Mine and West Mine have been designed to prevent runoff escaping the mine sites; therefore, no discharge of process generated waste water pollutants is expected to occur.
- b) The retention ponds at the East and West Mines are designed with the holding capacity to fully contain runoff from a 10-year, 24-hour precipitation event and from a 100-year, 30-minute event, noncontiguous. This design capacity meets the criteria discussed above.

7.1.3 Utah Environmental Congress

1. *Only one of two geographic sections of the proposed mine expansion enters IRA. The IRA impacts would be substantial and they would be permanent. It is clear that an action alternative needs to be developed that explicitly does not allow mining in the IRA (IRA map included in body of earlier scoping documents).*

Response: Although the Forest Plan provides direction and guidance for management activities on NFS lands administered by the Forest, NFMA implementing regulations at 36 CFR 219.15(a) allow for exception of authorizations of occupancy and use from being consistent with a forest plan if the forest plan expressly allows such occupancy and use, permit, contract, and other authorizing instrument for such use and occupancy. The Forest Plan makes this allowance through the statement, “As soon as practicable after the Forest Plan is approved, the Forest Service will ensure that, subject to valid existing rights, all outstanding and future permits and other occupancy and use documents which affect National Forest System lands are consistent with the Forest Plan” (Forest Plan, p. III-1). The Sunroc mining operation is a valid existing right under the General Mining Law of 1872; thus, the approval of the Plan for activities necessary for mining is an authorization that is an exception from the regulatory requirement of consistency with the Forest Plan.

2. *The viewshed impacts would also be significant and they would also be permanent. They are additionally in violation of the Land and Resource Management Plan. The LRMP and its restrictions were established for reasons and those commitments need to be honored here. In*



Chapter 7 – Comments and Responses

light of this the proposed action (and/or a new action alternative) needs to be developed where no mining is allowed that is in conflict with the LRMP direction for viewshed and scenery protection and preservation.

Response: As part of the proposed action in the DEIS, the expansion of the mine onto NFS lands was believed to require a site specific, non-significant Forest Plan amendment to change the visual resource designation of the area. Upon further review of the implementing regulations for the National Forest Management Act at 36 CFR 219.15(a) and the Forest Plan, and as explained in the response to Comment 1 (above), the Forest has determined that a Forest Plan amendment would not be required under the Proposed Action.

- 3.** *Our concerns with wildlife and golden eagle/habitat impacts were raised in the earlier enclosed comments. All action alternatives need to honor those concerns and incorporate those appeal resolution agreement terms.*

Response: Alternative Three (Preferred Alternative) includes mitigations that incorporate raptor and migratory bird monitoring. Forest Biologists will monitor the golden eagle nests within Chicken Creek and Pigeon creek annually to determine nest status and to determine how the eagles respond to mining operations. Surveys to determine the presence of active nests for raptors and other migratory birds will occur before blasting activities take place, if work is to begin during nesting or restricted time period and in the appropriate time of year. Timing restrictions (January 1 – August 31) will be placed on mining operations if active golden eagle nests are observed within the buffer zones surrounding the active mining areas. For raptors, the recommended spatial buffer for active nests is 1.0 mile. Mitigation measures would be developed (which could include no mining operations during the remainder of the nesting season) if a positive response is observed.

- 4.** *The big game habitat impacts will be significant and they will be permanent. The Forest Service can allow continued mining in the area with negligible or no additional mining impacts to big game habitat. The proposed action (and an action alternative) need to be further developed that allow some mining (it is active currently) while avoiding all additional negative mining impacts to big game wildlife habitat.*

Response: Mule deer and Rocky Mountain elk occur in the Project Area and timing restrictions will be placed on the mining operation during the winter months, i.e., December 1-April 15 to prevent impacts to key winter foraging habitat. The San Pitch Mountains contain over 17,704 acres of key and general big game winter range. This disturbance would equate to a loss of less than 0.5 percent of the key and general big game winter range within the mountains.



7.2 Responses to Comments Received on the DEIS

This section presents the Forest's responses to comments received on the DEIS.

7.2.1 Department of the Interior, U.S. Geological Survey

1. *The document discusses birds that are “expected to be present” but does not provide references for the birds that are actually found in the area. We suggest that the references be provided. One source for information on bird species that breed in the area can be found on the USGS Breeding Bird Survey site located at:*
<http://www.pwrc.usgs.gov/BBS/results/reoutemaps/routeMapStatic.html>.

Response: Information has been added to Table 3.9 from the suggested reference.

2. *The USGS Breeding Bird Survey also provides information on migratory routes located near the project area. The list of species and routes can be found at:*
<http://www.pwrc.usgs.gov/BBS/PublicDataInterface/index.cfm>. and
<http://www.pwrc.usgs.gov/BBS/results/routemaps/routeAssignMap.cfm>.

Response: Information has been added to Table 3.9 from the suggested references. Additional language has been added to Impacts Section, 3.4.3.2, to address this comment using the recommended references. Population trends and impacts are discussed.

3. *In addition, the degree to which the avian populations may be affected depends on the status (increasing or decreasing population) of the species. We suggest the Final EIS include an evaluation of the likely impacts relative to the trends in the status of the avian species. Information on trends in bird population is available at:*
<http://www.mbr-pwrc.usgs.gov/BBS/BBS.html>, and in the publication:
Sauer, J. R., J. E. Hines, and J. Fallon, K. L. Pardieck, D. J. Ziolkowski, Jr., and W. A. Link,

2011. *The North American Breeding Bird Survey, Results and Analysis 1966 – 2009. Version 3.23.2011. USGS Patuxent Wildlife Research Center, Laurel, MD.*

Response: Additional language has been added to Impacts Section 3.4.3.2 to address this comment using the recommended references. Population trends and impacts are discussed.

4. *We suggest that the Final EIS replace the Sauer et al, 2008 reference with the more recent 2011 publication.*

Response: The reference has been replaced in Section 3.4 and changed in Chapter 6 (References) as well.



7.2.2 U.S. Environmental Protection Agency Water Resources

1. *The DEIS acknowledges that blasting and land disturbance can alter flow paths that deliver groundwater to springs which are a potable water supply for the Town of Levan and result in decreased discharge rates to those springs. These potential impacts cause us to be concerned that the DEIS hydrogeological assessment lacks a complete assessment of the effects of mining on these springs.*

Response: With the present level of hydrogeologic knowledge of the area it is not possible to predict long term impacts to the Town of Levan spring collection system. In order to mitigate some of the uncertainty associated with mining associated impacts to water resources the Forest made an effort to have piezometers installed in the Chicken Creek alluvium. As stated in Section 3.7.4, page 3-68: “As an added protection measure, due to the uncertainty of the possible impacts to water resources, in October 2011 the Forest Service requested Sunroc to install six piezometers in the Chicken Creek alluvial deposits for the purpose of monitoring water levels to help assess any possible impacts to water resources in the Chicken Creek drainage resulting from mining operations. The piezometers were to be located up gradient and down gradient of the East and West mines and near each of the spring collection systems. The piezometers were to be monitored on a quarterly basis and an annual report submitted to the Forest Service.” The Town of Levan, UT objected to the installation of piezometers primarily out of fear that they would be vandalized. The Forest decided not to pursue the matter any further.

As stated in Section 3.7.2, page 3-66: The IGES report concluded that mining operations at the Chicken Creek Mine are likely to result in loss of ground water recharge and alteration of ground water flow paths. These impacts are predicted to be minimal based upon the ratio of estimated loss of recharge to the total ground water budgets for the Juab Valley and the Chicken Creek watersheds. “Their conclusions were based upon the estimated volume of annual water losses and withdrawals compared to the total annual water volume estimates for the Chicken Creek watershed and southern Juab Valley.”

2. *For example, the Sunroc hydrogeology report (IGES August 2011) focused on impacts to the watershed and regional groundwater system, rather than the springs.*

Response: Chicken Creek watershed is the recharge area for Rosebush and Tunnel Springs. The IGES report correlated the mining related impacts in the recharge areas to the possible, associated impacts to the springs. Since the springs are recharged by the watershed and regional ground water system, it logically follows that any possible impacts to them could be correlated to possible impacts experienced at the springs.

3. *The report also contains insufficient empirical data relative to groundwater flow and quality in the Arapien Formation, which is the source of water to both Tunnel Spring and Rosebush Spring.*



Chapter 7 – Comments and Responses

Response: There are no known drilling records available that would provide depth to water and other hydrogeologic data. Flow paths depicted in the IGES report are based on topography and surface water features; the shallow ground water flow paths can be fairly well determined by observing the topography and location of surface water bodies. There are no empirical data in the IGES report that would support conclusions depicting the direction of deep water flow paths (those crossing topographic divides).

Section 3.7.2, Page 3-66, last paragraph states: “Not having a comprehensive hydrogeologic analysis of the project area (with more empirical data) and a thorough understanding of the subsurface stratigraphy (and the resulting variations in hydraulic conductivity), it is not possible to make an accurate prediction how the geological heterogeneity (together with the proposed mining operations) will affect the local and regional ground water flow systems. The effects that changing the topography through strip mining will have on the inter-relationship between recharge and discharge areas and the quantities discharged through those systems cannot be accurately predicted.”

4. *There is no depth to water or water quality data for the Arapien Formation.*

Response: The question regarding depth to water is answered in the response above (#3). Water quality data for the Arapien Formation are available in the analytical records of the quarterly water quality sampling performed on Rosebush and Tunnel springs. The water sampling/testing follows state protocol.

5. *Without depth to water data, the direction of groundwater flow cannot be determined.*

Response: Without determining the potentiometric surface through actual depth measurements or by some other means (such as by seismic refraction) and without having a detailed knowledge of the stratigraphy/hydrogeology, the deep ground water flow paths cannot be known with certainty. However, the shallow ground water flow paths can be fairly well determined by observing the topography and location of surface water features.

6. *Without background water quality data, there is no way to compare future water quality data to pre-mining water quality. This data is necessary to accurately predict the potential impacts to these springs from future mining.*

Response: Appendix D of the IGES report has the analytical records of ground water samples for Rosebush and Tunnel Springs dating back to 1978. The water samples were tested for several parameters. Quarterly water quality sampling is now part of the monitoring program. Continuous flow meters have also recently been installed on both springs to indicate any changes in volume. Temporal changes in ground water quality and quantity at the springs would be apparent through the current monitoring program.

Comments 7 and 8 were presented as **Recommendations** by the EPA.



Chapter 7 – Comments and Responses

7. *The EPA recommends further analysis of mining impacts to the springs (water supplies) be performed and disclosed in the final EIS with recommendations for mitigation and a contingency water supply if necessary. Further analysis should include determination of depth of mining relative to the depth to water in the Arapien Formation and a focus on determining impacts to the springs rather than comparing the flows to the entire watershed. There is a need to install groundwater monitoring wells to determine the water table /piezometric surface configuration so groundwater flow direction can be determined. Finally, the capture zone associated with the spring discharge should be estimated and delineated.*

Response: A hydrogeologic investigation of the type necessary to gain the recommended empirical data would be an expensive undertaking. There are no Utah state guidelines requiring the mine to acquire the type of recommended data. The water quality and quantity monitoring program in current use at both spring collection systems is in compliance with state requirements. When the Forest Service suggested that six piezometers be installed in the Chicken Creek alluvium to provide an additional data source, the effort was rebuffed by the Town of Levan.

8. *Since the future mine will occur within 750 feet of Rosebush Spring, the EPA recommends the USFS consider increasing the distance between the mine and this spring. Buffer zones are a well recognized BMP. The most effective distance would be determined in part based on more information about groundwater flow in the Arapien.*

Response: Sunroc holds the mining claims at the East Mine that are within 750 feet of Rosebush Spring. The Forest Service does not have the authority to block Sunroc from accessing its claims.

Ground water flow time-zonation diagrams are presented in the IGES hydro report. An effective buffer zone could possibly be determined with an extensive hydrogeologic investigation. The investigation might show that the 750 foot distance between Rosebush Spring and the East Mine is sufficient. The investigation could also show that a much larger buffer zone is required; if this were the case, it is problematic whether the Forest Service would have the authority to block Sunroc from accessing its claims.

The distance between the proposed new disturbance due to open pit mining on the Forest and the eastern collection point at Rosebush Spring is approximately 750 feet. Proposed new disturbance on private land is actually a little bit closer, approximately 700 feet; the Forest has no control over private land disturbance. The south boundary of Sunroc's Claim 1E is less than 400 feet from the western collection point at Rosebush Spring. Claim 1E is not in the proposed mine expansion; however, if Sunroc chose to expand its mining operation in that direction at some time in the future, a new hydrogeologic assessment would be required to determine the impacts of mining less than 400 feet from the western collection point at Rosebush Spring.



U.S. Environmental Protection Agency Air Quality

1. *The EPA is concerned that the DEIS lacks disclosure of existing air quality conditions and emissions inventory. The machinery and operating equipment at a mine site create*

emissions, and the activities at a mine (excavating, blasting and crushing) create fugitive emissions. In addition, the proposed road construction will also decrease air quality because of the emissions from the equipment used and the fugitive dust created. Decision-makers need to understand baseline conditions in an effort to ensure that project activities, when combined with air quality impacts from external sources, do not adversely impact the National Ambient Air Quality Standards or Air Quality Related Values. While it is helpful to disclose that the State of Utah, Department of Environmental Quality has issued an air quality permit for the current mining operation, additional information is necessary for a thorough analysis.

Response: The Approval Order (AO) issued by the Utah Division of Air Quality and the 2008 and 2011 Emission Inventories for the Chicken Creek Gypsum Mine are included in Appendix C. The AO addresses vehicle, crusher, operations equipment, drilling and blasting operations, haul roads and fugitive dust emissions. An emission inventory is conducted every three years. The 2008 Emission Inventory (with amendment) and 2011 Emission Inventory show that the mine is in compliance with all air quality standards.

Comments 2 and 3 were submitted as **Recommendations** by the EPA.

2. *The final EIS should disclose the current existing air quality conditions and all air quality related value environmental impacts.*

Response: Additional language has been added to Section 1.6.2 Part A, to address this comment, the mine is located in an NAAQS attainment area for all standards measured.

3. *The EPA recommends that the final EIS provide an inventory of predicted emissions, including road construction emissions that would be associated with the mining activities, as well as a discussion of proximity to sensitive receptors. If emissions are substantial and/or in close proximity to sensitive receptors, such as population areas or federal Class I areas, then the final EIS also should include an air impact analysis presenting direct, indirect, and cumulative impacts of these activities on sensitive receptors.*

Response: The final EIS includes the Air Approval Order as an appendix. This document discloses the equipment and operating emissions. There are no substantial emissions or sensitive receptors near the project area and there are no Class I areas that would be impacted by emission/dust from this proposed project. This issue will remain part of the Issues Considered but Not Further Evaluated.



**U.S. Environmental Protection Agency
Environmental Justice**

1. *The DEIS does not appear to contain information regarding steps taken to coordinate with or letters of consultation with Tribal partners (Paiute Indian tribe of Utah, Ute Indian Tribe and Hopi Tribe).*

Recommendation: *The EPA recommends that the communications with Tribal partners be included in an appendix to the final EIS.*

Response: The Ute and Paiute Tribes were contacted by a scoping letter. As stated on page 1-12 of the EIS, “Copies of the cultural resource report were sent to the Ute Tribe, Hopi Tribe and the Paiute Tribe of Utah. No issues or concerns were identified by them.” An appendix is not required to further support this.



7.3 Comment Letters

The comment letters are presented in their entirety on the following pages.

7.3.1 Comment Letters Received During Initial Project Scoping

7.3.1.1 National Park Service

ROXANNE
RUNKEL/DENVER/NPS
@NPS TO
THOMAS W LLOYD/R4/USDAFS@FSNOTES

08/28/2008 01:01 CC
PM
DALE MORLOCK/WASO/NPS@NPS, ELLEN
SINGLETON/WASO/NPS@NPS

SUBJECT
NO COMMENT ER

HI TOM,
THE NATIONAL PARK SERVICE HAS NO COMMENTS ON:
ER-08/0805 - SUNROC GYPSUM SURFACE MINE PLAN OF OPERATION, MANTI-LA
SAL

THANK YOU,
ROXANNE

ROXANNE RUNKEL
NATIONAL PARK SERVICE
PLANNING & ENVIRONMENTAL QUALITY
IMDE - OPE
12795 W. ALAMEDA PKWY.
LAKEWOOD, CO 80228-2822
PHONE: (303) 969-2377 FAX: (303) 969-2063
ROXANNE_RUNKEL@NPS.GOV



7.3.1.2 U.S. Environmental Protection Agency

EPA comments on Manti-La Sal National Forest Gypsum Mine
Sept. 13, 2008

Dear Mr. Lloyd:

Thank you for the opportunity to discuss this scoping last week. I have synthesized EPA's comments below for your information. Please feel free to contact me if there are any specific environmental questions or issues that you would like to discuss with us before the DEIS is completed. We have a team of air, water, waste and NEPA experts available and we have found that pre-DEIS work often addresses difficult issues that cause project delays.

You explained that the existing mine covers approximately 20 acres and the proposed expansion will disturb approximately another 100 acres. I believe that you also mentioned that further work may occur after this phase. If this is the case, and if the timeframes anticipated are close, you might want to consider wrapping all of the phases under this one EIS.

Finally, please assure that cumulative impacts (past, present and foreseeable future) on environmental resources caused by this action are considered in the DEIS.

I have outlined a few specific comments from our non-point source specialist below:

- * Revegetation and reclaiming of the road to pre-development conditions should be included in the post operation reclamation plans. Perhaps this is included in the Office of Surface Mining permit.
- * Consider buffer zones for ancillary facilities like equipment staging areas if these are not considered in the OSM permit.
- * Use of road dust suppressants is critical for air and water impacts. No chemical dust suppressants should be used within a buffer zone of navigable waters. Speed zones are often not obeyed.
- * Consider whether upstream and downstream monitoring of dissolved and suspended solids is needed and possibly selenium. In addition, sampling of macro-invertebrate communities upstream and downstream would provide a baseline for pre-expansion stream biology.
- * Considering the expansion is five times the existing surface area, consider increased erosion control measures to protect the streams in the area. Erosion modeling should inform the need accordingly.



Chapter 7 – Comments and Responses

* If DEIS dust/air modeling indicates significant impacts will occur during operation and mitigation is necessary, please feel free to discuss with our air experts prior to finalization of the DEIS.

* There are no new source performance standards for gypsum mines. The following standards would apply to the NPDES permit.

§ 436.52 Effluent limitations guidelines representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available.

[top](#)

Except as provided in §§125.30 through 125.32, any existing point source subject to this subpart shall achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT):

(a) For operations not employing wet air emissions control scrubbers there shall be no discharge of process generated waste water pollutants into navigable waters.

(b) Only that volume of water resulting from precipitation that exceeds the maximum safe surge capacity of a process waste water impoundment may be discharged from that impoundment. The height difference between the maximum safe surge capacity level and the normal operating level must be greater than the inches of rain representing the 10-year, 24-hour rainfall event as established by the National Climatic Center, National Oceanic and Atmospheric Administration for the locality in which such impoundment is located.

[40 FR 48657, Oct. 16, 1975, as amended at 60 FR 33967

* Please include all Best Management Practices that will be used, especially those for erosion control, in the Draft EIS.

For questions regarding erosion control please contact the following:

Greg Davis
EPA Region 8 Storm Water Coordinator
Mailcode: 8P-W-WW
1595 Wynkoop Street
Denver, CO 80202-1129
Phone: 303-312-6314
<http://www.epa.gov/region8/stormwater>

Thank you for the opportunity to comment.

Robin R. Coursen
NEPA Reviewer
Ecosystems Protection and Remediation
National Environmental Policy Act
(303)312-6695
1595 Wynkoop St.
Denver, Colorado 80202-1129



Chapter 7 – Comments and Responses

7.3.1.3 Utah Environmental Congress



We speak for the Trees



August 28, 2008

Rod Player, Acting Forest Supervisor,
Manti-La Sal National Forest
599 West Price River Drive
Price, Utah 84501

RECEIVED
SEP 05 2008

Dear Rod,

The Utah Environmental Congress (UEC) thanks you for the decision to prepare an EIS for the Sunroc Gypsum Surface Mine, or Chicken Creek Gypsum mine expansion proposed action. UEC is an interested party and would like to be added to the Forest Service's contact and mailing lists for this and all related proposed actions. UEC is responding to the August 1, 2008 NOI to prepare an EIS and initiate scoping that is found at Federal Register Volume 73, number 149, page 44958.

UEC submitted scoping comments on the proposed action in June of this year when it was not being scoped for an EIS. There's actually no additional information found in the Federal Register NOI to prepare an EIS that is not found in the Forest Service's scoping comment solicitation letter and map of May 15th. The issues raised in UEC's earlier scoping comments are still relevant to the scope of this action, refinement of the proposed action, and alternative development. UEC's earlier scoping comments are incorporated entirely into these comments (enclosure).

Only one of two geographic sections of the proposed mine expansion enters IRA. The IRA impacts would be substantial and they would be permanent. It is clear that an action alternative needs to be developed that explicitly does not allow mining in the IRA (IRA map included in body of earlier scoping comments).

The viewshed impacts would also be significant and they would also be permanent. They are additionally in violation of the Land and Resource Management Plan. The LRMP and its restrictions were established for reasons and those commitments need to be honored here. In light of this the proposed action (and/or a new action alternative) needs to be developed where no mining is allowed that is in conflict with the LRMP direction for viewshed and scenery protection and preservation.

Our concerns with wildlife and golden eagle/habitat impacts were raised in the earlier enclosed comments. All action alternatives need to honor those concerns and incorporate those appeal resolution agreement terms.

1817 S. Main Street; Ste. 10 • Salt Lake City, UT 84115
Ph (801) 466-4055 • Fax (801) 466-4057
www.uec-utah.org




Chapter 7 – Comments and Responses

The big game habitat impacts will be significant and they will be permanent. The Forest Service can allow continued mining in the area with negligible or no additional mining impacts to big game habitat. The proposed action (and an action alternative) need to be further developed that allow some mining (it is active currently) while avoiding all additional negative mining impacts to big game wildlife habitat.

We thank you for your decision to prepare an EIS for this major federal action. Please mail a hard copy of the DEIS to our office when it becomes available.

Sincerely,


Kevin Mueller,
Executive Director



7.3.2 Comment Letters Received on the DEIS

7.3.2.1 Department of the Interior, U.S. Geological Survey

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Denver Federal Center, Building 67, Room 118
Post Office Box 25007 (D-108)
Denver, Colorado 80225-0007

February 8, 2012

9043.1
ER 11/1192

Mr. Howard Sargent, Forest Supervisor
Manti-LaSal National Forest
599 East Price River Drive
Price, UT 84501

Dear Mr. Sargent:

The Department of Interior has reviewed the Draft Environmental Impact Statement (DEIS), Chicken Creek Gypsum Mine, Proposed Plan of Operations to Conduct Mining Operations, Sanpete Ranger District, Manti-La Sal National Forest, Juab County, UT and offers the following comments provided by the U.S. Geological Survey (USGS).

3.4 MIGRATORY BIRDS

Pg. 3-37: The document discusses birds that are “expected to be present” but does not provide references for the birds that are actually found in the area. We suggest that the references be provided. One source for information on bird species that breed in the area can be found on the USGS Breeding Bird Survey site located at:

<http://www.pwrc.usgs.gov/BBS/results/routemaps/routeMapStatic.html>.

The USGS Breeding Bird Survey also provides information on migratory routes located near the project area. The list of species and routes can be found at:

<https://www.pwrc.usgs.gov/BBS/PublicDataInterface/index.cfm>. and
<http://www.pwrc.usgs.gov/BBS/results/routemaps/routeAssignMap.cfm>.

In addition, the degree to which the avian populations may be affected depends on the status (increasing or decreasing population) of the species. We suggest the Final EIS include an evaluation of the likely impacts relative to the trends in the status of the avian species.

Information on trends in bird population is available at:

<http://www.mbr-pwrc.usgs.gov/bbs/bbs.html>, and in the publication:



Chapter 7 – Comments and Responses

Mr. Howard Sargent, Forest Supervisor

2

Sauer, J. R., J. E. Hines, J. E. Fallon, K. L. Pardieck, D. J. Ziolkowski, Jr., and W. A. Link. 2011. *The North American Breeding Bird Survey, Results and Analysis 1966 - 2009. Version 3.23.2011* *USGS Patuxent Wildlife Research Center, Laurel, MD.*

Pg. 3-42: We suggest that the Final EIS replace the Sauer et al, 2008 reference with the more recent 2011 publication.

Thank you for the opportunity to review and comment on the DEIS. If you have any questions concerning these comments, please contact Gary LeCain, USGS Coordinator for Environmental Document Reviews, at (303) 236-1475 or at gdlcain@usgs.gov

Sincerely,

A handwritten signature in black ink that reads "Robert F. Stewart".

Robert F. Stewart
Regional Environmental Officer



7.3.2.2 U.S. Environmental Protection Agency

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
DENVER, CO 80202-1129
Phone 800-227-8917 <http://www.epa.gov/region08>
FEB 13 2012

Ref: 8 EPR-N

Elizabeth G. Close, Acting Forest Supervisor
Manti-La Sal National Forest
U.S. Department of Agriculture, Forest Service
599 West Price River Drive
Price, Utah 84501

Re: Draft Environmental Impact Statement for
Sunroc Corporation Chicken Creek Gypsum Mine,
Sanpitch Mountains, Juab County, Utah: CEQ#:
20110437

Dear Ms. Close:

In accordance with our responsibilities under Section 102(2)(C) of the National Environmental Policy Act (NEPA), 42 U.S.C. Section 433(2)(C) and Section 309 of the Clean Air Act, 42 U.S.C. Section 7609, the U.S. Environmental Protection Agency Region 8 (EPA) has reviewed the United States Forest Service's (USFS) Draft Environmental Impact Statement (DEIS) for the Sunroc Corporation (Sunroc) Chicken Creek Gypsum Mine, located in Chicken Creek Canyon on the western slopes of the San Pitch Mountains two miles east of the town of Levan, Utah. The EPA offers the following comments for your consideration.

This DEIS supplements the USFS's existing Plan of Operations for Chicken Creek East and Chicken Creek West Mine sites, to include additional USFS lands for surface mining that are not included in the currently approved plans and to combine the existing plans into a Large Mine Plan of Operations (Plan). The Plan proposes to: (1) mine additional claims on USFS lands to the Chicken Creek East and Chicken Creek West Mine sites, and (2) construct an access road and mine additional claims on USFS lands to the Upper Chicken Creek West area. The Plan would disturb 88.6 acres of USFS lands and 37.1 acres of private lands.

The DEIS includes three alternatives:



Chapter 7 – Comments and Responses

Alternative One: No Action. Under the No Action Alternative, Sunroc would not expand its mining operations on USFS lands and would continue its operations on the previously- approved mining areas.

Alternative Two: Proposed Action. Under Alternative Two, the USFS would approve the Plan as submitted. This alternative includes a reclamation plan, revegetation plan, a Soil and Water Conservation Program (SWCP), wildlife habitat protection, in addition to Best Management Practices (BMPs) for mine operations and maintenance phases.

The Plan proposes a disturbance of 88.6 acres on USFS land (11.3 acres of existing disturbance on the West Mine plus 77.3 acres of future disturbance on the East and West Mines) as well as 37.1 acres on private land. The East Mine would have a mine life of approximately 128 years and the Lower West and Upper West Mine would result in a mine life of 26 years each (for a total of 52 years). The Secretary of Agriculture would need to concur on the activities that impact the Levan Peak Inventoried Roadless Areas (IRAs). Impacts within the IRA include the construction of 0.5 miles (1.6 acres) of road in the Levan Peak unroaded/undeveloped area and 36 acres of disturbance associated with the West Mine expansion.

As proposed, the Plan for the expansion of the mine into USFS lands requires a site specific Forest Plan amendment to change the visual resource designation of the area so that human activities may dominate the original landscape but their evidence must blend with the landscape's natural characteristic.

Alternative Three: Proposed Action with Mitigation Measures. Under Alternative Three, USFS would approve the Plan as described above, including the Forest Plan amendment to change the visual resource designation of the area, with additional criteria needed to protect other non-mineral surface resources.

In addition to the operational mitigation and post-operational reclamation criteria described in Alternative Two, Alternative Three would impose additional mitigation and reclamation criteria to address potential project resource impacts. Specifically, these criteria will provide further wildlife disturbance and habitat protections/mitigation (especially birds and mule deer), restrictions on vehicle operations to designated mine roads, noxious weed control during operations, record keeping for topsoil salvage to verify salvage amounts, annual ore production reports, and additional hydrogeologic study to be completed by Sunroc in addressing USFS concerns about water resources. This alternative will also reduce noise and dust effects on the nearby Hidden Valley subdivision significantly for the first 10 years by beginning quarry operations furthest from this subdivision. Alternative Three also limits the amount of disturbed un-reclaimed land to 12-25 acres compared to 60 acres for Alternative Two, thereby reducing visual impacts to the subdivision.

Following are EPA 's key concerns and recommendations based on our review of the DEIS.



Water Resources

The DEIS acknowledges that blasting and land disturbance can alter flow paths that deliver groundwater to springs which are a potable water supply for the Town of Levan and result in decreased discharge rates to these springs. These potential impacts cause us to be concerned that the DEIS hydrogeological assessment lacks a complete assessment of the effects of mining on these springs. For example, the Sunroc hydrogeology report (IGES August 2011) focused on impacts to the watershed and regional groundwater system, rather than the springs. The report also contains insufficient empirical data relative to groundwater flow and quality in the Arapien Formation, which is the source of water to both Tunnel Spring and Rosebush Spring. There is no depth to water or water quality data for the Arapien Formation. Without depth to water data, the direction of groundwater flow cannot be determined. Without background water quality data, there is no way to compare future water quality data to pre-mining water quality. This data is necessary to accurately predict the potential impacts to these springs from future mining.

Recommendations:

- The EPA recommends further analysis of mining impacts to the springs (water supplies) be performed and disclosed in the final EIS with recommendations for mitigation and a contingency water supply if necessary. Further analysis should include determination of depth of mining relative to the depth to water in the Arapien Formation and a focus on determining impacts to the springs rather than comparing the flows to the entire watershed. There is a need to install groundwater monitoring wells to determine the water table /piezometric surface configuration so groundwater flow direction can be determined. Finally, the capture zone associated with the spring discharge should be estimated and delineated.
- Since the future mine will occur within 750 feet of Rosebush Spring, the EPA recommends the USFS consider increasing the distance between the mine and this spring. Buffer zones are a well recognized BMP. The most effective distance would be determined in part based on more information about groundwater flow in the Arapien.

Air Quality

The EPA is concerned that the DEIS lacks disclosure of existing air quality conditions and emissions inventory. The machinery and operating equipment at a mine site create emissions, and the activities at a mine (excavating, blasting and crushing) create fugitive emissions. In addition, the proposed road construction will also decrease air quality because of the emissions from the equipment used and the fugitive dust created. Decision-makers need to understand baseline conditions in an effort to ensure that project activities, when combined with air quality impacts from external sources, do not adversely impact the National Ambient Air Quality Standards or Air Quality Related Values. While it is helpful to disclose that the State of Utah, Department of Environmental Quality has issued an air quality permit for the current mining operation, additional information is necessary for a thorough analysis.



Chapter 7 – Comments and Responses

Recommendations:

- The final EIS should disclose the current existing air quality conditions and all air quality related value environmental impacts.
- The EPA recommends that the final EIS provide an inventory of predicted emissions, including road construction emissions that would be associated with the mining activities, as well as a discussion of proximity to sensitive receptors. If emissions are substantial and/or in close proximity to sensitive receptors, such as population areas or federal Class I areas, then the final EIS also should include an air impact analysis presenting direct, indirect, and cumulative impacts of these activities on sensitive receptors.

Environmental Justice

The DEIS does not appear to contain information regarding steps taken to coordinate with or letters of consultation with Tribal partners (Paiute Indian Tribti of Utah, Ute Indian Tribe and Hopi Tribe).

Recommendations:

The EPA recommends that the communications with Tribal partners be included in an appendix to the final EIS.

EPA Rating:

Because the USFS has not identified a preferred alternative, EPA is rating both of the action alternatives. EPA rates Alternatives Two and Three as "Environmental Concerns - Insufficient Information" or "EC-2." This rating indicates that our review has identified environmental impacts that should be avoided in order to fully protect the environment, and that the DEIS does not contain sufficient information for the EPA to fully assess environmental impacts.

We note that, although Alternative Three impacts to water resources necessitate the "EC" rating, this alternative incorporates important mitigation actions that significantly diminish the impacts of other resources project described in Alternative Two. Further, the EPA supports the conclusion of the USFS that these mitigation actions and measures substantially reduce resource impacts of the project by providing additional long term reclamation and monitoring.

We appreciate the opportunity to review and comment on this DEIS. If you have any questions regarding these comments, please feel free to call me at (303) 312-6925. You may also contact Robin Coursen of my staff at (303) 312-6695.



Chapter 7 – Comments and Responses

Sincerely,

A handwritten signature in blue ink, appearing to read 'Suzanne J. Bohan', followed by a horizontal line.

Suzanne J. Bohan, Director
NEPA Compliance and Review Program
Office of Ecosystems Protection and Remediation

Enclosure:
EIS Rating System Criteria



Chapter 7 – Comments and Responses

U.S. Environmental Protection Agency Rating System for Draft Environmental Impact Statements

Definitions and Follow-Up Action*

Environmental Impact of the Action

LO -- Lack of Objections: The Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC-- Environmental Concerns: The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Collective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO-- Environmental Objections: The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU—Environmentally Unsatisfactory: The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category I-- Adequate: EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information .

Category 2-- Insufficient Information: The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new, reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the act ion. The identified additional information, data, analyses or discussion should be included in the final EIS.



Chapter 7 – Comments and Responses

Category 3-- Inadequate: EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. February, 1987.



APPENDIX A

**PAST, PRESENT, AND REASONABLY FORESEEABLE
FUTURE ACTIONS**

**PAST, PRESENT, AND REASONABLY FORESEEABLE
FUTURE ACTIONS**

PAST ACTIONS	IMPLEMENTATION DATES (Begin and End)	RESIDUAL EFFECTS
<p>MINERALS/ENERGY</p> <p>Gypsum Quarries Gypsum is the primary mineral mined on the Sanpete Ranger District. Gypsum mining has occurred at the Chicken Creek East and West Mines for several decades by various operators. The current operator is Sunroc Corporation.</p>	<p>1920's to Present</p>	<p>Little, if any, reclamation has occurred on the private portion of the East and West mines; no slope stabilization efforts, recontouring, or reseeding efforts are apparent. Reclamation efforts on the Forest portion of the West Mine have not been determined.</p>
<p>Sunroc has also operated a gypsum mine at the Levan Henry Quarry, approximately 3 miles to the south of the Chicken Creek Mines.</p>	<p>~1940 to Present</p>	<p>As above, reclamation efforts on the private portion of the mine are indeterminable; no slope stabilization efforts, recontouring, or reseeding efforts are apparent. The valley floor near the mouth of the canyon has been filled in and overlain with approximately 30 feet of gypsum and rock to build a work platform for the mining operations. Any reclamation efforts are not distinguishable.</p>
<p>The Nephi Gypsum Quarry is located approximately 12 miles north of the Chicken Creek Mine, in the Uinta National Forest.</p>	<p>1985 to Present</p>	<p>On the Forest portion of the mine, reclamation efforts have been minimal and have consisted of steep benching along the hillsides where the gypsum has been removed and some revegetation on the canyon bottom.</p> <p>This is a patented mining claim within the Uinta National Forest. Currently approximately 12 acres have been disturbed; none of which have been reclaimed.</p>
<p>Other Quarries A search of Forest records indicated nine other quarries in the San Pitch mountains within 11 miles of the Chicken</p>	<p>N/A</p>	<p>The disturbance areas associated with each of these inactive quarries are small. Vegetation will eventually reestablish itself. Disruption to wildlife, hydrology, and other Forest resources has not been quantified.</p>

PAST ACTIONS	IMPLEMENTATION DATES (Begin and End)	RESIDUAL EFFECTS
<p>Creek mining operations. Four are listed as alluvium deposits, three as limestone, one as an igneous intrusive, and one as an undefined commodity. The records are old but none of the quarries located within the National Forest are believed to be active. A check of the Utah Mineral Occurrence Data Sheets showed that one quarry is listed as a Utah Department of Highways sand and gravel pit at the mouth of Pigeon Creek, about one mile northwest of the Chicken Creek mine; its operational status is unknown.</p> <p>Coal Mining Outcrops of Cretaceous strata are present on the east side of the Sanpete Ranger District with the possibility of having some thin coal seams. However, there are no operating coal mines on the Sanpete Ranger District.</p> <p>Oil and Gas The Utah Division of Oil, Gas and Mining database indicates that there are no abandoned or producing oil or gas wells on the Sanpete Ranger District.</p> <p>Geothermal Geothermal development has not occurred in the area. The Sanpete Ranger District is outside any known geothermal resource areas.</p> <p>Uranium There is an abandoned uranium mine in T 12S R1E, northeast of Nephi, outside the Sanpete Ranger District. No other uranium prospecting or mining activity is known of in the area.</p> <p>Other Locatable Minerals The Utah Geological Survey Mineral Occurrence database indicates that some small scale prospecting, mining, and production has taken place for various locatable minerals outside the Sanpete Ranger District.</p>	<p>N/A</p> <p>N/A</p> <p>N/A</p> <p>Unknown</p> <p>Unknown</p>	<p>N/A</p> <p>N/A</p> <p>N/A</p> <p>Unknown</p> <p>Unknown</p>

PAST ACTIONS	IMPLEMENTATION DATES (Begin and End)	RESIDUAL EFFECTS
<p>TIMBER</p> <p>In 1984 willows were planted along Chicken Creek after the flooding from the 1983-1984 snow pack. The following year, the stream channel was modified, and the dead cottonwood trees were felled.</p> <p>In 1985 check dams were installed in Chicken Creek.</p> <p>Fuelwood cutting occurs in the project area within 150 feet of system roads.</p>	<p>1984 thru 1985</p> <p>Annually</p>	<p>Stream bank stabilization and improved riparian habitat.</p> <p>Improved public safety.</p>
<p>FIRE/FUELS</p> <p>There have been some wild fire occurrences within the Sanpitch Mountains but none in the proposed project area.</p>	<p>Fires have always burned within this landscape but the increase of pinion/juniper within this area has increased the fire intervals but most stay to less than 1 acre only 2 since 2004 have been larger than 500 ac.</p>	<p>Due to old growth P/J and fires, some erosion has occurred. Fires were treated with BAER and most of the areas are stable with good understory re-entering the fire areas.</p>
<p>RANGELAND/WATERSHED/VEGETATION</p> <p>Livestock grazing.</p>	<p>1880-1960</p>	<p>Possible change in species composition. Increased bare ground</p>
<p>NOXIOUS WEEDS</p> <p>Current infestations (few and sporadic) are located along Chicken Creek road.</p>	<p>Unknown</p>	<p>Noxious weed species outcompete native species</p>

PAST ACTIONS	IMPLEMENTATION DATES (Begin and End)	RESIDUAL EFFECTS
<p>WILDLIFE</p> <p>Gypsum mining is the primary mineral mined on the Sanpete Ranger District. Gypsum mining has occurred at the Chicken Creek East and West Mines for several decades by various operators. The current operator is Sunroc Corporation.</p>	<p>1920's to Present</p>	<p>Reduced nesting habitat for raptors, specifically golden eagles. Permanent loss of vegetation in mined areas if reclamation activities are unsuccessful. This vegetation loss reduces habitat for many species including elk and deer.</p>
<p>TRANSPORTATION</p> <p>National Forest System roads have been developed for grazing, timber operations, recreation and mineral operations and for direct access connecting adjacent valleys.</p>	<p>1870 - present</p>	<p>Establishment of roadway removes vegetation and creates disturbed areas. Increased sediment and dust from maintenance equipment activities, motorized and non-motorized vehicles and livestock traffic during summer months.</p> <p>Snow machines and winter recreation activities during winter months.</p> <p>Creates sediment and dust from disturbed areas</p>
<p>RECREATION</p> <p>Forest system roads constructed to be used for recreation and access.</p> <p>Chicken Creek Campground renovated.</p> <p>During the floods of 1983-1984 damage to the Campground in Chicken Creek was repaired by reshaping banks, realigning the stream channel, construction of retaining walls and seeding of disturbed soil.</p> <p>Water and Toilets Added to Campground in Chicken Creek; fees are required for use.</p> <p>Water is shut off in Campground; fees no longer required for use.</p>	<p>1900s to present</p> <p>1960's (Approximately)</p> <p>1983-1984</p> <p>2000s</p>	<p>Road maintenance continues with grading and vegetation removal. Access to the Forest remains a high demand.</p> <p>Increased use of this facility.</p> <p>Use curtailed during repair work; this site remains a lightly used facility.</p> <p>Light use primarily in Spring and Fall continues.</p>

PAST ACTIONS	IMPLEMENTATION DATES (Begin and End)	RESIDUAL EFFECTS
<p>VISUALS</p> <p>Establishment of the upper and lower Levan Peak Communication Site on the Manti- La Sal N.F.</p> <p>Development of the Henry Mine on the Manti- La Sal N.F.</p> <p>Development of the Chicken Creek Mine on the Manti-La Sal N.F.</p> <p>Construction of Forest system roads, trails and private roads for grazing, timber, recreation, and private access.</p>	<p>Beginning in 1974</p> <p>Early 1920's to present</p> <p>1900 to present</p>	<p>Some of the electronic communication towers, particularly their microwave covers, are visible along the skyline of the San Pitch Mountains from the valley below. Some meet VQOS of partial retention and some do not.</p> <p>Might be visible from top of the Chicken Creek mine, but not visible from Hwy 28 or the Town of Levan. Meets VQO of partial retention.</p> <p>Visible from Levan, UT. Does not meet VQO of partial retention.</p> <p>Forest roads and trails provide opportunities for people to view the landscape and are consistent with VQO's.</p>
<p>LANDS/SPECIAL USES</p> <p>Construction of a water diversion structure and transmission pipeline in the adjacent Deep Creek for irrigation purposes.</p> <p>Construction of a water collection system at the mouth of Old Pinery Canyon to supply water to an LDS welfare farm.</p>	<p>1983</p> <p>1950</p>	<p>There is a reduction in total volume of water coming out of Deep Creek Canyon watershed.</p> <p>There is a reduction in total volume of water coming of Old Pinery Canyon watershed.</p>

Section II – Present Actions

PRESENT ACTIONS	DATE	CURRENT EFFECTS
<p>MINERALS/ENERGY</p> <p>Gypsum Sunroc Corporation is currently operating the gypsum quarries at the Chicken Creek East and West Mines. Sunroc has submitted a Plan of Operations to expand further into the Levan Peak IRA at the West Mine and onto non-IRA Forest Land at the East Mine.</p> <p>Coal Mining No exploration plans have been submitted for review.</p> <p>Oil and Gas No APD's have been submitted for review.</p> <p>Geothermal There have been no indications of interest in geothermal development on the Sanpete Ranger District.</p> <p>Uranium and Other Locatable Minerals No Plans of Operation have been submitted.</p>	<p>Gypsum production from the 1920's to the present.</p> <p>N/A</p> <p>N/A</p> <p>N/A</p> <p>N/A</p>	<p>At the West Mine, operations have currently disturbed 11.3 acres of the Levan Peak IRA and an additional 6.9 acres of private ground. The Plan of Operations proposes another 36.0 acres of disturbance to the Levan Peak IRA at the West Mine. The Plan also proposes 41.3 acres of disturbance to the Forest at the East Mine.</p> <p>N/A</p> <p>N/A</p> <p>N/A</p> <p>N/A</p>
<p>TIMBER</p> <p>Tree removal may occur when a hazard tree is identified along the road or in a campground.</p> <p>Fuelwood cutting occurs in the project area within 150 feet of system roads.</p>	<p>Annually</p>	<p>Improved public safety.</p> <p>Small reduction in fuel load.</p>

PRESENT ACTIONS	DATE	CURRENT EFFECTS
FIRE No Projects are currently being implemented within a 12 mile radius of this project.	N/A	N/A
RANGELAND/WATERSHED/VEGETATION Forest Service land in the project area is part of a sheep allotment. There is no current grazing in this area or range improvements.	Present	Vegetation is recovering from past historical overgrazing.
NOXIOUS WEEDS Noxious weed treatment is occurring throughout the project area to control current infestations.	Present	Decrease noxious weed species and potential for spread.
WILDLIFE User created OHV routes continue to increase. Current mining operations.	Present	Fragmenting habitat for many species and also degrading habitat by spreading noxious weeds and reducing range capacity.

PRESENT ACTIONS	DATE	CURRENT EFFECTS
<p>TRANSPORTATION</p> <p>Continued use and maintenance of National Forest Service Roads and Trails.</p>	<p>Present</p>	<p>Sediment and dust from disturbed areas due to road use as described under Past Actions</p>
<p>RECREATION</p> <p>Campground toilets and fire pits are maintained by volunteers. Dispersed camping throughout Chicken Creek is managed through FPO patrols.</p> <p>OHV routes are used frequently by hunters, recreationists and permittees.</p>	<p>Present</p> <p>Present</p>	<p>Use at Campground continues.</p> <p>Popularity of OHV use continues, resulting in increased need for FPO patrols due to off route usage. This type of use is negatively impacting soils and vegetation in some areas.</p>
<p>VISUALS</p> <p>The past actions listed above for visuals presently continue.</p>	<p>Present</p>	<p>Current effects are the same as those listed above.</p>
<p>LANDS/SPECIAL USES</p> <p>The past actions listed above for lands and special uses presently continue.</p>	<p>Present</p>	<p>Current effects are the same as those listed above.</p>

Section III – Future Actions

FUTURE ACTIONS	DATE	ANTICIPATED EFFECTS
<p>MINERALS/ENERGY</p> <p>Gypsum The Forest will complete its EIS of Sunroc Corporation's proposal to extend their mining operations onto Forest Land at the Chicken Creek East and West Mines.</p> <p>The Forest's review of Sunroc Corporation's Plan of Operations for the Henry Mine will be completed in 2011. The NEPA process will begin at that point.</p> <p>Coal Mining No foreseeable projects.</p> <p>Oil and Gas No foreseeable projects.</p> <p>Geothermal No foreseeable projects.</p> <p>Uranium and Other Locatable Minerals No foreseeable projects.</p>	<p>2011</p> <p>2011</p> <p>N/A</p> <p>N/A</p> <p>N/A</p> <p>N/A</p>	<p>If approved as submitted, there will be 77.3 acres of future disturbance to the Forest, of which 36.0 acres will be to the Levan Peak IRA.</p> <p>The Plan of Operations proposes an additional 39.0 acres of disturbance to Forest Land.</p> <p>N/A</p> <p>N/A</p> <p>N/A</p> <p>N/A</p>
<p>TIMBER</p> <p>No timber harvest is proposed in the project area.</p> <p>Fuelwood cutting occurs in the project area within 150 feet of system roads</p>	<p>N/A</p> <p>Annually</p>	<p>N/A</p> <p>Improved public safety and small fuel load reduction.</p>

FUTURE ACTIONS	DATE	ANTICIPATED EFFECTS
<p>FIRE/FUELS</p> <p>There is a project proposal on the North side of Levan Peak in the Deep Creek Drainage on the upper 1/3 slope in the Douglas fir and understory, it will be a cut / pile and burn. There will be an understory burn to follow too strengthen the fir stand the location is T 15 S, R 1 E, Section 20.</p>	<p>This project area is scheduled for NEPA (planning) to start in late 2012 or early 2013 and Implementation to start in 2014-15</p>	<p>This will reduce the effects of a catastrophic fire with in the Levan Peak IRA and protect the multi-million dollar communication facility on Levan Peak and the other out buildings associated with the site.</p> <p>This project will also allow fire to play a more natural role in the ecosystem which will reduce the sediment and unnatural drainage flows which produce large cut ravines and unwanted sediment into the valley below.</p>
<p>RANGELAND/WATERSHED/VEGETATION</p> <p>Due to the lack of water and range improvements no domestic grazing can occur in the project area.</p>	<p>NA</p>	<p>NA</p>
<p>NOXIOUS WEEDS</p> <p>Noxious weed treatment will continue.</p>	<p>Indefinite</p>	<p>Noxious weed densities and spread should decrease.</p>
<p>WILDLIFE</p> <p>No wildlife enhancement projects are currently in the planning stage on the Sanpete Ranger District.</p> <p>Future mining operations.</p>	<p>N/A</p> <p>Indefinite</p>	<p>N/A</p> <p>Impacts to wildlife resources would be as described under Past and Present Actions (above).</p>

FUTURE ACTIONS	DATE	ANTICIPATED EFFECTS
<p>TRANSPORTATION</p> <p>Continued road maintenance and road improvements</p>	Indefinite	Increased use of roads due to increased public interest in recreational activities and potential resource extraction.
<p>RECREATION</p> <p>Dispersed camping will continue to require management through FPO compliance patrols and potentially future containment of campsites. The Chicken Creek Campground will continue to be accessible to the public. OHV use will continue to be managed by improving existing designated routes and eliminating user created trails.</p>	Indefinite	Reduced impact to soils and vegetation. Enhanced recreation opportunities in the Chicken Creek area.
<p>VISUALS</p> <p>Continued mineral exploration and development.</p>	Indefinite	An attempt would be made to mitigate any effects of future mining so that VQOs could be met.
<p>LANDS/SPECIAL USES</p> <p>There will likely be future requests for special use permits in the San Pitch Mountains.</p>	Indefinite	It is hard to determine what effects there would be for unidentified future special use permits, but an effort would be made to mitigate any so that they were consistent with the forest plan.



APPENDIX B

SOIL AND WATER CONSERVATION PRACTICES

&

BEST MANAGEMENT PRACTICES

Appendix B
(Forest Service Handbook 2509.22)
Soil and Water Conservation Practices (SWCP's)
&
Best Management Practices (BMP's)

Soil and water conservation practices are grouped by; management activity for ease of presentation and understanding. A number of the practices are referenced to more than one activity, and some apply to all activities. For this Appendix, only those practices applicable to mining activities and reclamation following mining are given: (11) Watershed Management, (13) Vegetation Manipulation, (15) Roads and Trails, and (16) Minerals. Although a practice might be shown under only one activity designation, it may apply to another activity

11 - WATERSHED MANAGEMENT. Watershed management is the practice of protecting and maintaining soil and water resources and water-related beneficial uses. Management is oriented toward maintaining or enhancing watershed conditions favorable for optimum water yield and timing, water quality, and soil productivity. Watershed management includes the improvement of soil and water resources on National Forest lands damaged by catastrophic events or degraded by past use.

- **PRACTICE 11.06 - Public Supply Watershed Management**

OBJECTIVE: To manage community and noncommunity public supply watersheds to comply with State water quality standards.

EXPLANATION: The Northern and Intermountain Regions will manage public supply watersheds for multiple use with special emphasis on providing water suitable for human consumption within the realm of State Water Quality Standards, water supply regulations, and Forest Plan standards.

IMPLEMENTATION: Watersheds identified by the States as public supply watersheds will be recognized in Forest Plans. Forest Plans will include management goals and standards which will guide the management of the watershed and result in compliance with State Water Quality Standards. All project plans will be reviewed through the NEPA process which includes review by the appropriate State agency and by the water users and tiered to direction in the Forest Plans and EIS.

REFERENCES: FSM 2542; State Drinking Standards; State Public Water Supply Regulations; 36 CFR 251.

- **PRACTICE 11.07 - Oil and Hazardous Substance Spill Contingency Planning**

OBJECTIVE: To minimize contamination of waters from accidental spills by prior planning and development of Spill Prevention Control and Countermeasure Plans.

EXPLANATION: A contingency plan is an immediate reporting and action plan that contains a predetermined organization to be implemented in the event of a hazardous substance spill. Factors considered for each spill are: the specific substance spilled, the quantity, its toxicity, proximity of spill to waters, and the hazard to life, property, and the environment.

The Spill Prevention Control & Countermeasure (SPCC) plan is a document which requires appropriate measures to prevent oil, petroleum products, or known hazardous materials that could be spilled from entering the navigable waters of the United States. An SPCC plan is needed if the total, above-ground storage of oil, petroleum products, or known hazardous materials exceeds the appropriate "reportable quantity" and if these facilities could reasonably be expected to discharge these hazardous substances into surface waters in the event of a spill.

IMPLEMENTATION: Each Forest is responsible for designating emergency spill coordinators and documenting names and telephone numbers of agencies to call regarding notification and clean-up of spills. Individual Forests may maintain an inventory of materials to use during the clean-up of a spill. Disposal sites will be coordinated with EPA, State, and local officials responsible for safe disposal.

If a spill is from a Forest Service facility or operation, the Forest Service is the "person in charge" and is responsible for all reporting and immediate response actions, as appropriate. If the spill is from a third party operation, the Forest Service will only respond and report the spill if the third party fails to take appropriate action. The Forest Service will generally turn its incident command role over to authorized, Federal On-Scene Coordinators or other authorized, State or local authorities after their arriving at the spill site, and provide support services.

SPCC plans are required for Forest Service owned and special use permitted facilities, and include timber sale operators and other construction contracts. All SPCC plans must be reviewed and certified by a registered professional engineer.

REFERENCES: FSH 6740, 7442, 7443, and 7460; 40 CFR 112; FSH 6709.11, Health and Safety Code Handbook; FSH 6709.12, Safety and Health program Handbook; R-1 and R-4 Emergency and Disaster Plan; Oil and Hazardous Substances Pollution Contingency Plan for EPA Regions 8 and 10, 7/26/85; State Hazardous Waste management Plans; SWCP 11.11, 13.07, and 13.10.

- **PRACTICE: 11.11 - Petroleum Storage and Delivery Facilities and Management**

OBJECTIVE: To protect surface and subsurface soil and water resources from petroleum fluid contamination resulting from leaking petroleum delivery systems and storage facilities.

EXPLANATION: Petroleum delivery and storage facilities will be located, designed, constructed, and maintained in a manner that minimizes the potential for contamination of surface and subsurface soil and water resources from leaking flowlines, pipelines and storage tanks. Roads, vegetative manipulation, and other considerations should be evaluated in the construction and maintenance of these facilities.

IMPLEMENTATION: The siting and operation of petroleum delivery systems and storage facilities will follow applicable Federal (EPA) and state guidelines and requirements with regard to:

- a. Design/Location.
- b. Construction
- c. Installation.

- d. Operation procedures.
- e. Testing.
- f. Release detection systems.
- g. Recordkeeping requirements.
- h. Leak/spill reporting requirements.
- i. Abandonment.

Storage facilities and delivery systems on National Forest lands will require a license and/or special use permit. Licenses and permits require the project to comply with all State and local standards. Relevant SWCPs from this and other sections may be required: 11.04, 11.05, 11.07, 11.08, 11.10, 13.04, 13.07-13.13, 14.12-14.14, 14.20, 15.01-15.18, 15.21.

REFERENCES: Resource Conservation and Recovery Act of 1976, (90 Stat. 2795), as amended; Underground Storage Tank Regulations (40 CFR part 280); State Hazardous Waste management Plans; FSM 7460.

13 - VEGETATION MANAGEMENT.

- **PRACTICE: 13.04 - Revegetation of Surface Disturbed Areas**

OBJECTIVE: To protect soil productivity and water quality by minimizing soil erosion.

EXPLANATION: This practice is used to stabilize the surface of the disturbed area through the influence of vegetation. The vegetation will be selected to meet many or most of the management objectives for the area; range, wildlife, timber, fuels, minerals, aesthetics, and so forth. Grass or browse species may be seeded between recently planted trees for erosion prevention, wildlife habitat enhancement, or other management needs.

The factors evaluated are soil fertility, slope, aspect, landtype characteristics, soil water holding capacity, climatic factors, vegetation species characteristics, and project objectives. These are field determinations and office interpretations made by an interdisciplinary team.

IMPLEMENTATION: The identification of disturbed areas and species mix will be determined during the NEPA process. The responsible Line Officer assigns specific individuals to execute the project. Projects are subsequently monitored to assess the revegetation effectiveness, and need for follow-up action.

REFERENCES: FSM 2522, 2405, 2472, and 7721; SWCP 11.02, 11.03, and 14.13; see references in "Best Management Practice" Definition (05--2 and 3).

15 - ROADS AND TRAILS. Transportation systems are developed to serve the transportation needs of National Forest System lands and resource management programs.

- **PRACTICE: 15.03 - Road and Trail Erosion Control Plan**

OBJECTIVE: To prevent, limit, and mitigate erosion, sedimentation, and resulting water quality

degradation prior to the initiation of construction and maintenance activities through effective contract administration during construction and timely implementation of erosion control practices.

EXPLANATION: Land disturbing activities usually result in at least short-term erosion. Poorly designed, located, constructed, and maintained roads and trails are usually responsible for the majority of stream sedimentation problems associated with forest management practices. By effectively planning for erosion control, sedimentation can be minimized.

Roads and trails require a variety of erosion control measures. Many erosion control practices will not only protect water quality but also maintain road prism integrity, reduce maintenance costs, and improve trafficability. The location of the road or trail with respect to streams, beneficial uses of that water, soil, and geologic information and other site factors govern the degree of stabilization required. Stabilization usually includes a combination of practices that promotes the reestablishment of vegetation on exposed slopes, provides physical protection to exposed surfaces, prevents and downslope movement of soil, or controls road drainage.

Since a newly constructed road is most susceptible to erosion from seasonal precipitation, the timing of erosion control practices is of primary concern. Those practices that can be accomplished concurrent with road counteractions shall be favored as a means of immediate protection of the water resource.

IMPLEMENTATION: Erosion control objectives and detailed mitigation measures are developed using an interdisciplinary approach during the environmental analysis. These measures and objectives shall be reflected in the contract specifications and provisions for the road or trail. When standard specifications do not provide the degree of mitigation required, special project specifications will be developed by the interdisciplinary team.

Prior to the start of construction, the Purchaser shall submit a schedule for proposed erosion control work as required in the Standard Specifications. The schedule shall include all erosion control items identified in the specifications. The schedule shall consider erosion control work necessary for all phases of the project. The Purchaser's construction schedule and plan of operation will be reviewed in conjunction with the erosion control plan to insure their compatibility before any schedules are approved. No work will be permitted on the project until all schedules have been approved by the Contracting Officer.

The Contracting Officer or Engineering Representative shall ensure that erosion control measures are implemented according to the approved schedule and are completed in an acceptable fashion. Field reviews and on-site inspection by the Line Officer and/or Forest Engineer will identify any additional erosion control measures required to protect the streams that were not recognized during planning or design. Necessary correction measures shall be implemented immediately through normal administrative channels.

The following items may be considered as erosion control measures when constructed in a timely manner. To maximize effectiveness, erosion control measures must be in place and functional prior to seasonal precipitation or runoff.

- a. Measures to reestablish vegetation on exposed soils. This is usually accomplished by seeding suitable grass and legume species in conjunction with mulching and

fertilization. In some situations, treatments may include tree seedling planting or sprigging of other woody species.

b. measures which physically protect the soil surface from detachment or modify the topography to minimize erosion. These treatments may include the use of dust oil or gravel on the road travelway and ditches and the use of mulches, riprap, erosion mats, and terracing on cuts, fills, and ditches. Temporary waterbars in areas of uncompleted roads and trails can be effectively utilized to reduce sedimentation.

c. Measures which physically inhibit the downslope movement of sediments to streams. These may include the use of slash filter windrows on or below the fill slopes, baled straw in ditches or below fillslopes, catch basins at culvert inlets, and sediment basin slash filter windrows may be utilized in live water drainages where fish passage is not required and where peakflows are low.

d. Measures that reduce the amount of soil disturbance in or near streams. These measures may include dewatering culvert installation or other construction sites, and immediate placement of permanent culverts during road pioneering. Temporary pipes should not be allowed unless positive control of sedimentation can be accomplished during installation, use, and removal.

e. Measures that control the concentration and flow of surface and subsurface water. These may include insloping, outsloping, ditches, cross drains, under drains, trenches, and so forth.

REFERENCES: FSM 7721, 7722, and 7723; Timber Sale Contract Provisions B6.31, B6.5, B6.6, and C6.3; see references in "Best Management Practice" Definition (05--2 and 3); In R-4: R-4 Technical Guide - Erosion prevention and Control on Timber Sale Areas, May 1981; Cook, M.J. and J.G. King. 1983. Construction Cost and Erosion Control Effectiveness of Filter Windrows on Fill Slopes. USDA Forest Service Research Note, INT-335; SWCP Handbook 10.40 Feedback mechanism; FSH 7709.56b, Drainage Structures Handbook.

- **PRACTICES: 15.05 - Slope Stabilization and Prevention of Mass Failures**

OBJECTIVES: To reduce sedimentation by minimizing the chances for road-related mass failures, including landslides and embankment slumps.

EXPLANATION: Road construction in mountainous terrain requires cutting and loading natural slopes which may lead to landslides and/or embankment failures depending on the soil strength, geology, vegetation, aspect, and groundwater regime. Landslides and embankment failures are undesirable because they interrupt traffic, are costly to repair, visually unacceptable, and generate large quantities of erosion and sedimentation.

Roadways may drastically change the subsurface drainage characteristics of a slope. Since the angle and height of cut and fill slopes increase the risk of instability, it is often necessary to provide subsurface drainage to avoid moisture saturation and subsequent slope failure. Where it is necessary, horizontal drains, drainage trenches, or drainage blankets may be used to lower the subsurface water levels and to prevent groundwater from entering embankments.

In areas with high landslide potential, the composition and characteristics of embankments may be controlled since they are essentially engineered structures. Care must be taken to prevent the incorporation of construction slash or other organic material and the embankment material should be placed by one of the following methods.

- a. Layer placement.
- b. Controlled compaction.
- c. Controlled compaction using density controlled strips.
- d. Compaction controlled with a special project specification.

IMPLEMENTATION: In areas with intrinsic slope stability problems, appropriate technical resource staffs must be involved in an interdisciplinary approach to route location. Sufficient subsurface investigation and laboratory testing must be performed to general design parameters and mitigating features which will meet the constraints and requirements developed through the NEPA process.

In contracted projects, compliance with environmental analysis requirements and controls which have been provided for in the specifications is assured by enforcement of the Timber Sale Contract Provisions by the Contracting Officer and/or Engineering Representative.

REFERENCES: FSM 7706.11, 7706.12, 7710, and 7720; Standard Specifications 203, 212, 605, 613, 619, 630, and 631; Timber Sale Contract Provisions B6.31, B6.62, C5.2, C5.4, and C6.36; FSH 7709.11, Transportation Engineering Handbook and FSH 7709.56b, Drainage Structures Handbook; see references in "Best Management Practice" Definition (05--2 and 3); In R-4: R-4 Technical Guide - Erosion prevention and Control on Timber Sale Areas, May 1981.

- **PRACTICE: 15.06 - Mitigation of Surface Erosion and Stabilization of Slopes**

OBJECTIVE: To minimize soil erosion from road cutslopes, fillslopes, and travelway.

EXPLANATION: Road construction exposes fresh, loose soil to the erosive force of wind, water, and traffic. Surface erosion from roads is greatest during the first year following construction. It is desirable to minimize erosion due to the adverse impacts on water quality, vehicle maintenance, road maintenance, and safety. Erosion can occur on cutslopes, fillslopes, and/or travelway. Each of the three surfaces has unique erosion consideration which are outlined below:

<u>Surface</u>	<u>General Characteristics</u>	<u>Stabilization-Mitigation Measures</u>
Cutslope	Steeper, undisturbed, and more sterile soil	Vegetative and mechanical stabilization
Fillslope	Flatter, loose, and more fertile soil	Vegetative and mechanical stabilization

Travelway

Flattest, compact (due
to traffic)

Surface Stabilization

Vegetative measures include seeding herbaceous species (grass, legumes, or browse species) or the planting of brush or trees.

Fertilization, mulching, watering, and/or erosion netting and fabrics may be required to insure success.

Mechanical measures include construction of slash windrows, straw bale dams, erosion netting and fabrics, terraces, or benching, riprapping, tackifiers, and gunnite.

Surface stabilization includes watering, dust oiling, dust pallatives, aggregate layer, bituminous surface treatment, or asphalt paving depending on traffic, soils, and climatic factors.

An integrated system of collection control, and dispersion of concentrated surface water is very important in order to prevent erosion on fillslopes, travelways, and natural slopes below cross drains and culverts.

IMPLEMENTATION: During the NEPA process, detailed mitigation measures and slope stabilization techniques are incorporated into the design package by the interdisciplinary team. Compliance with environmental analysis controls and requirements is obtained by the Contracting Officer and/or Engineering Representative through the Standard Specifications and/or Timber Sale Contract Provisions.

REFERENCES: FSM 7706.11, 7706.12, 7706.13, and 7720; Standard Specifications 50.4, 203, 204, 206A, 210, 212, 412, 619, 625, 626, 629, and 630; Timber Sale Contract Provisions B6.31, B6.6, B6.62, B6.65, B6.66, C5.2, C5.23, C5.4, C5.441, C5.46, R-1 C6.36, C6.52, C6.6, C6.601, and C6.622; SWCP 15.03 and 15.04; see references in "Best Management Practice" Definition (05--2 and 3); In R-4: R-4 Technical Guide - Erosion prevention and Control on Timber Sale Areas, May 1981.

- **PRACTICE: 15.07 - Control of Permanent Road Drainage**

OBJECTIVE: To minimize the erosive effects of concentrated water and the degradation of water quality by proper design and construction of road drainage systems and drainage control structures.

EXPLANATION: Degradation of water quality by sediment and the erosive effects of surface runoff can be minimized by stabilizing the road prism and adjacent disturbed areas from erosion. Velocities in the road drainage system can be dissipated before entry into the natural system by design and construction of control structures.

A number of measures can be used alone or in combination to control the detrimental effects of road drainage. Methods used to control water and reduce erosion may include: properly spaced culverts, cross drains, water bars, rolling dips, energy dissipaters, aprons, gabions, and armoring of ditches and drain inlets and outlets. Dispersal of runoff can also be accomplished by rolling the grade, insloping, outsloping crowning, contour trenching, installation of water spreading ditches, and so forth.

IMPLEMENTATION: Project location, design criteria, drainage control features, and detailed mitigation measures are determined during the NEPA process by an interdisciplinary approach. Compliance with plans, specifications, and operating plans is assured by the Contracting Officer or Engineering Representative.

REFERENCES: SWCP 15.02, 15.03, 15.06; Timber Sale Contract Provisions B6.6, B6.66, C6.3, C6.6, and C6.601; FSM 7721, 7723, 7706.11, and 7706.12; FSH 7709.56b, Drainage Structures Handbook; see references in "Best Management Practice" Definition (05--2 and 3); In R-4: R-4 Technical Guide - Erosion prevention and Control on Timber Sale Areas, May 1981.

- **PRACTICE: 15.09 - Timely Erosion Control Measures on Incomplete Roads and Streamcrossing Projects**

OBJECTIVE: To minimize erosion of and sedimentation from disturbed ground on incomplete projects.

EXPLANATION: The best drainage design and erosion control measure can be useless if projects are incomplete at the end of the normal operating season. Affected areas can include roads, fills, tractor trails, skid trails, landings, streamcrossings, bridge excavations, and firelines. Preventive measures include:

- a. The removal of temporary culverts, culvert plugs, diversion dams, or elevated streamcrossing causeways.
- b. The installation of temporary culverts, side drains, flumes, cross drains, diversion ditches, energy dissipaters, dips, sediment basins, berms, debris racks, or other facilities needed to control erosion.
- c. The removal of debris, obstructions, and spoil material from channels and floodplains.
- d. Grass seeding, planting deep rooted vegetation, and/or mulching.

IMPLEMENTATION: Protective measures must be applied to all areas of disturbed, erosion-prone, unprotected ground that is not to be further disturbed in the present year. When conditions permit operations outside the Normal Operating Season, erosion control measures must be kept current with ground disturbance, to the extent that the affected area can be rapidly closed, if the weather conditions deteriorate. Areas must not be abandoned for the winter with remedial measures incomplete.

Project location and mitigative measures are developed in the NEPA process using an interdisciplinary approach. Compliance with environmental analysis controls and requirements, contract specifications, and operating plans are assured by the Contracting Officer or Engineering Representative.

REFERENCES: FSM 7721; Standard Specification 206; Timber Sale Contract Provisions B6.31, B6.6, C6.6; FAR 52.213-3, 52.236-15, and 4G-52.235-107; SWCP 15.03 and 15.04; see reference in "Best Management Practice" Definition (05--2 and 3).

- **PRACTICE: 15.10 - Control of Road Construction Excavation and Sidecast Material**

OBJECTIVE: To reduce sedimentation from unconsolidated excavated and sidecast material caused by road construction, reconstruction, or maintenance.

EXPLANATION: Unconsolidated material from road construction is frequently exposed on cut and fillslopes, can be difficult to stabilize, and represents a major sediment source. The area of exposed material is often reduced when the cut and fillslopes and roadbed are constructed to the lines, grades, and dimensions shown on the drawings or designated on the ground. The Contracting Officer and/or Engineering Representative insures that construction is within tolerances, particularly on sections of high erosion or stability hazards. In some cases layer placement and/or benching may be necessary for stabilization and to obtain the proper dimensions and fill slope ratios. End hauling and retaining structure may be necessary to prevent thin layers of consolidated material from being sidecast on steep slopes where compaction is impractical. Prior to commencing construction, reconstruction, or maintenance activities, waste areas should be located where excess material can be deposited and stabilized. If waste areas are located on steep slopes, sidecast materials should be consolidated and stabilized. Disposal of slide debris should be in areas where it can be stabilized. The purchaser may be required to remove excess material not placed according to the contract and/or restore damaged areas.

Normal erosion control such as seeding should be supplemented with special mitigation measures such as jute netting, erosion cloth, mulching, slash windrows, sediment ponds, hay bale dams, and rock gabions, when such measures are determined necessary for local conditions.

IMPLEMENTATION: Project location, selected disposal areas, and mitigative measures are developed through the NEPA process, using an interdisciplinary approach. Forest Service supervisors are responsible for insuring that In-Service projects meet design standards and project requirements. For contracted projects, compliance with specifications and operating plans is assured by the Contracting Officer and/or Engineering Representative.

REFERENCES: FSM 7720.3, 7706.11, and 7721; Standard Specification 203; SWCP 15.03, 15.05, 15.06, and 15.09; Timber Sale Contract Provisions C6.221 and C5.4; see reference in "Best Management Practice" Definition (05--2 and 3).

- **PRACTICE: 15.11 - Servicing and Refueling of Equipment**

OBJECTIVE: To prevent contamination of waters from accidental spills of fuels, lubricants, bitumens, raw sewage, wash water, and other harmful materials.

EXPLANATION: During servicing or refueling, pollutants from logging or road construction equipment may enter a watercourse. This threat is minimized by selecting service and refueling areas well away from wet areas and surface watercourses and by using berms around such sites to contain spills.

IMPLEMENTATION: The Contracting Officer, Engineering Representative, or certified Sale Administrator will designate the location, size and allowable uses of service and refueling areas. They will also be aware of actions to be taken in cause of a hazardous spill, as outlined in the Forest Hazardous Substance Spill Contingency Plan (SWCP 11.07).

REFERENCES: SWCP 11.07; Timber Sale Contract Provisions B6.34, C6.341, and C6.34; Standard Specifications 204.42; FSH 2409.15, Timber Sale Administration Handbook; see reference in "Best Management Practice" Definition (05--2 and 3).

- **PRACTICE: 15.12 - Control of Construction in Riparian Areas**

OBJECTIVE: To minimize the adverse effects on Riparian Areas from roads and trails.

EXPLANATION: Except at designated stream crossings, road and trail construction will avoid placing fill materials or structures in Riparian Areas that will directly affect the ecological values of the stream. Occasionally exceptions may occur. These instances should be identified by the interdisciplinary team in the NEPA process and the final location designed to create the minimum impact possible. Factors such as stream class, channel stability, sideslope steepness, slope stability, resources dependent on these areas and standards, guidelines, and direction from Forest Plans are considered in determining the management of activities and width of Riparian Areas. Mitigation measures should be used to the optimum to insure minimum impact.

IMPLEMENTATION: Riparian Area requirements are identified during the environmental analysis by the interdisciplinary team. The road or trail project is designed to include site specific recommendations for the prevention of sedimentation and other stream damage from road/trail activities. As appropriated, monitoring and evaluation will be identified in the NEPA documentation. Forest Service supervisors are responsible for insuring that In-Service projects meet design standards and project requirements. On contracted projects, compliance with project requirements, contract specifications and operating plans is assured by the Contracting Officer or Engineering Representative.

REFERENCES: SWCP 11.02, 14.03, and 14.06 FSM 7706.11 7706.12, 7706.14 and 7710; Timber Sale Contract Provisions B6.5, B6.61, C6.51, and C6.52; see reference in "Best Management Practice" Definition (05--2 and 3).

- **PRACTICE: 15.13 - Controlling In-Channel Excavation**

OBJECTIVE: To minimize stream channel disturbances and related sediment production.

EXPLANATION: During the construction of roads and the installation of stream crossing structures, it may be necessary for construction equipment to cross, operate in, or operate near streamcourses. However, this will be allowed only at crossings designated by the Forest Service or as necessary in the construction or removal of culverts and bridges. Close coordination is needed with the Purchaser to minimize damage to the stream and aquatic resources.

Also, excavation during the installation of streamside structures should be accomplished in the following manner in order to protect water quality. Unless otherwise approved, no excavation shall be made outside of caissons, cribs, cofferdams, or sheet piling, and the natural stream bed adjacent to the structure shall not be disturbed without approval of the Engineering Representative or Contracting Officer. If any excavation or dredging is made at the site of the structure before caissons, cribs, or cofferdams are sunk in place, all such excavations will be restored to the original ground surface or the stream bed will be protected with suitable stable material. Material deposited within the stream area from foundation or other excavation shall not be discharged directly into live streams but shall be pumped to settling areas shown on the drawings or approved by the Engineering Representative or Contracting Officer. If the channel

is damaged during construction, it should be restored as nearly as possible to its original configuration without causing additional damage to the channel. Excavations for stream crossings should be started early enough in the summer so that the installation is complete before winter.

IMPLEMENTATION: Project location and mitigation measures are developed by the interdisciplinary team during the NEPA process and are inserted into the contract. Compliance with the management requirements, contract specifications, and operating plans is assured by the Contracting Officer or Engineering Representative.

REFERENCES: FAR 52.213-3, 52.236-15, and 4G-52.236-107; FSM 7721 and 2502.1; Standard Specifications 206; Timber Sale Contract Provisions C6.36, C6.52, and B6.5; EO 11988, Flood Plain Management; SWCP 11.04, 11.05, 14.03, 14.06, and 15.12; see reference in "Best Management Practice" Definition (05--2 and 3); In R-4: R-4 Technical Guide - Erosion Prevention and Control on Timber Sale Areas, May 1981

- **PRACTICE: 15.15 - Streamcrossings on Temporary Roads**

OBJECTIVE: To keep temporary roads from unduly damaging streams, disturbing channels, or obstructing fish passage.

EXPLANATION: Culverts, temporary bridges, low water crossings, or fords will be required on temporary roads at all locations where it is necessary to cross streamcourses. Such facilities shall be designed and installed to provide unobstructed stream flow and fish passage, and to minimize damage to streamcourses.

The number of crossings shall be kept to the minimum needed for access. Channel crossings should generally be as perpendicular to streamcourses as possible. Streambank excavation shall be kept to the minimum needed for use of the crossings.

Crossing facilities shall be removed when the facility has served its purpose and is no longer needed. Fills associated with these facilities shall also be removed.

IMPLEMENTATION: Project location and protective measures are developed by the interdisciplinary team during the NEPA process. Those developed by the Purchaser will be reviewed and approved by the certified Sale Administrator or Contracting Officer. Forest Service supervisors are responsible for insuring that In-Service projects meet management objectives and requirements. For contracted projects, compliance with specifications and operating plans is assured by the Contracting Officer, certified Sale Administrator, or Engineering Representative.

REFERENCES: Timber Sale Contract Provisions B6.5, B6.62, B6.65, C6.3, C6.51, C6.52, C6.6, and C6.753; FSH 2409.15, Timber Sale Administration Handbook, FSM 2505.1 and 7721; FAR 4G-52.236-107; SWCP 11.04, 11.05, 14.03, 14.06, 14.17, 15.12, 15.13, and 15.14; see reference in "Best Management Practice" Definition (05--2 and 3); In R-4: R-4 Technical Guide-Erosion Prevention and Control on Timber Sale Areas, May 1981.

- **PRACTICE: 15.16 - Bridge and Culvert Installation (Disposition of Surplus Material and Protection of Fisheries)**

OBJECTIVE: To minimize sedimentation and turbidity resulting from excavation for in-channel structures.

EXPLANATION: Excavation in or near streamcourse is a common requirement for the installation of bridges, culverts, and other streamside structures such as weirs, check dams, riprapping, or fish passage structures. Surplus material should not obstruct the streamcourse including the floodplain nor the efficiency of the associated structure. Preventive measures include:

- a. Diverting stream flow around project sites during construction in order to minimize erosion and downstream sedimentation.
- b. Easily erodible material shall not be deposited into live streams.
- c. Any material stockpiled on floodplains shall be removed before rising waters reach the stockpiled material.
- d. During excavation in or near the streamcourse, it may be necessary to use suitable coffer dams, caissons, cribs or sheet piling. This will usually be the case where groundwater is contributing a significant amount of water to the immediate excavation area. If any of the aforementioned devices are used, they will be practically watertight and no excavation will be immediately outside of them. If water from subsurface strata is not significant, pumping may be used, provided the sediment from the pumped water can be disposed of where it will not re-enter the stream during high flows.
- e. Water pumped from foundation excavation shall not be discharged directly into live streams, but shall be pumped into settling ponds.
- f. When needed, bypass roads should be located to have the minimal disturbance on the streamcourse.
- g. The construction activity in or adjacent to the stream will be limited to specific times to protect beneficial water uses (such as fisheries).

IMPLEMENTATION: Project location and detailed mitigative measures are developed in the environmental analysis and are detailed in the appropriate NEPA document using an interdisciplinary team approach. Forest Service supervisors are responsible for insuring that In-Service projects meet the design standards. For contracted projects, compliance with contract specifications and operating plans is assured by the Contracting Officer or Engineering Representative.

REFERENCES: FAR 52.213-3, 52.236-15, and 4G-52.235-107; Standard Specifications 206 and 206A; Timber Sale Contract Provision C6.5; FSM 2505.1; see reference in "Best Management Practice" Definition (05--2 and 3).

- **PRACTICE: 15.17 - Regulation of Borrow Pits, Gravel Sources and Quarries**

OBJECTIVES: To minimize sediment production from borrow pits, gravel sources, and quarries, and limit channel disturbance in those gravel sources suitable for development in floodplains.

EXPLANATION: Borrow pits, gravel sources, and quarries are often susceptible to erosion due to steep side slopes, lack of vegetation, and/or their proximity to water courses. Whenever possible, the top soil should be removed and stockpiled for use as surface dressing during the reclamation phases, prior to excavation of the site.

Drainage design for the excavation should consider temporary erosion control measures during the life of the material source and permanent drainage control measures after the site has been rehabilitated. When excavation of the site has been completed on all or part of the area, and the site will not be used again, the sides will be sloped, graded, or scaled and the general pit area smoothed and stabilized. Oversized material, if planned for future use as riprap or derrick rock, should be stockpiled. If not, it should be scattered or buried. Finer material, if available, should be spread over the bottom of the pit prior to spreading stockpiled or imported topsoil. Seeding, mulching, and/or planting should be carried out. If the site will be used again, the above requirements will be limited to those essential to resource protection between uses. Access roads to the site should also have temporary or permanent drainage design for erosion control depending on the life of the pit or the roads should be ripped, drained, blocked to traffic, and seeded, mulched, and/or planted unless other uses are planned.

Borrow pits and gravel sources located in floodplains require special attention. Material deposited in floodplains or along channel sections during storm runoff often provide excellent and inexpensive sand and gravel. Because of easy access, these deposits are often in demand. With careful planning and design, these deposits can be removed with minimal impact on water resources. Under some circumstances, sand and/or gravel removal may alter stream flow characteristics and consequently affect stream channel stability and create a new sediment source. Excavation of these deposits within stream channels should be limited to those above the waterline which is normal for the period of the excavation. If the borrow area is subject to periodic flooding, leveling, shaping, or other special drainage features shall be provided.

Excavation in flood plains should not take place below the water table unless sediment basins are built to contain or catch the resulting sediment. Sediment basins should not be subject to washouts. If excess sediment accumulates in basins, it should be excavated to clean the basin and the sediment removed to an approved site.

Wash water or waste from concrete batching or aggregate operations shall not be allowed to enter streams prior to treatment by filtration, flocculations, settling and/or other means. The potential pollution of adjacent water resources by blasting agent in quarry operations shall be addressed in the pit operation plan.

IMPLEMENTATION: Project feasibility, location, suitability, and the limits for disturbance and sediment production will be identified through the NEPA process using an interdisciplinary approach. Detailed mitigative measures are developed by the design engineer using criteria from the environmental analysis and through consultation with technical resource staffs when needed.

Development of borrow pits or gravel sources in the floodplain will be coordinated with State and local agencies.

Special-use permits issued for borrow pits, gravel sources, and quarries will include the above requirements and District Rangers or their representatives are responsible for insuring compliance. Forest Service supervisors are responsible for implementing In-Service projects to design standards. For contracted projects, compliance with management requirements, specifications, and operating plans is assured by the Contracting Officer or Engineering Representative.

REFERENCES: FSM 2511, 2502.1, 7706.11, 7706.12, 7721; FSH 7709.11, Transportation Engineering Handbook, and FSH 7709.56, Road Preconstruction Handbook; FAR 52.236-09; Standard Specifications 203, 210, 611, 624, 625, 626, and 629; Timber Sale Contract Provision B6.31, B6.6, B6.62, B6.65, and B6.66, C5.2, C5.23, C5.4, C6.36, C6.52, C6.6, C6.601, C6.622; Water Pollution Control Act, 33 USC 466; NEPA; Montana Water Quality Act and Hardrock Act; Idaho Dredge and Placer Mining Act, Title 47, Ch. 13; SWCP 11.04, 11.05, 15.03; see reference in "Best Management Practice" Definition (05--2 and 3).

- **PRACTICE: 15.19 - Streambank Protection**

OBJECTIVE: To minimize sediment production from streambanks and structural abutments in natural waterways.

EXPLANATION: The stabilization of stream embankments disturbed by the construction of a water crossing or a roadway fill parallel to a streamcourse, is necessary to prevent erosion of the material during natural stream flow. To reduce sediment and channel bank degradation, it is necessary to incorporate "armoring" in the design of a structure to allow the water course to stabilize after construction. Riprap, gabion structures, and other measures are commonly used to armor stream banks and drainage ways from the erosive forces of flowing water. These measures must be sized and installed in such a way that they effectively resist erosive water velocities. Stone used for riprap should be free from weakly structured rock, soil, organic material and materials of insufficient size, all of which are not resistant to stream flow and would only serve as sediment sources. Outlets for drainage facilities in erodible soils commonly require riprapping for energy dissipation.'

IMPLEMENTATION: Project location and detailed mitigative measures are developed through the NEPA process to meet the objectives and requirements of the management. Forest Service supervisors are responsible for implementing In-Service projects to design standards and management requirements. For contracted projects, compliance with contract specifications and operating plans is assured by the Contracting Officer or Engineering Representative.

REFERENCES: SWCP 15.03; see references in "Best Management Practice" Definition (05--2 and 3); In R-4: R-4 Technical Guide-Erosion Prevention and Control on Timber Sale Areas, May 1981.

- **PRACTICE: 15.20 - Water Source Development Consistent With Water Quality Protection**

OBJECTIVE: To supply water for road construction and maintenance and fire protection while maintaining water quality.

EXPLANATION: Water source development is normally needed to supply water for road construction, dust control, mixing surface, compaction, planting and for fire control requirements of the timber Purchaser. Water source development should aim toward the construction of durable, long term water sources rather than the construction of hasty, expedient developments. Permanently designed sources, such as tanks, will result in the lowest, long term impact to the affected streams.

Other considerations in the development of water sources should be:

- a. Downstream flow should not be reduced so as to detrimentally affect aquatic resources, fish passage, or other uses.
- b. Temporary cofferdams should be constructed of sandbags containing sand or clean gravel, or of other materials and means which will not induce sediment in the stream.
- c. Overflow should go directly back into the stream.
- d. All temporary facilities for gathering water will be removed prior to causing any resource damage.

IMPLEMENTATION: Certified Sale Administrators and Engineering Representatives in conjunction with technical resource staffs should evaluate streams in which water developments may be constructed. Project location and detailed mitigative measures are developed by the interdisciplinary approach during the environmental analysis. Forest Service supervisors are responsible for insuring that In-Service projects meet design standards and management requirements. For contracted projects, compliance with contract specifications and the operating plan is assured by the Contracting Officer and/or engineering Representative.

Any damage to resources caused by Purchaser's operations or fire suppression activities shall be retired by purchaser or fire suppression crews in a timely and agreed manner to the extent practical to restore and prevent further resource damage.

REFERENCES: Standard Specification 207; Timber Sale Contract Provisions; SWCP 14.03; Timber Sale Administration Handbook (FSH 2409.150; see references in "Best Management Practice" Definition (05--2 and 3).

• **PRACTICE: 15.21 - Maintenance of Roads**

OBJECTIVE: To maintain all roads in a manner which provides for soil and water resource protection by minimizing rutting, failures, sidecasting, and blockage of drainage facilities.

EXPLANATION: Roads normally deteriorate because of use and weather impacts. This deterioration can be minimized through proper and timely maintenance and/or restriction of use (SWCP 11.09). All system roads will be maintained to at least the following level: Provide the basic custodial care required to protect the road investment and to insure that damage to adjacent land and resources is held to minimum. This level of maintenance often requires an annual inspection to determine what work, if any, is needed to keep drainage functional and the road stable. This level is the normal prescription for roads that are closed to traffic. As a minimum measure, maintenance must protect drainage facilities and runoff patterns. Higher levels of

maintenance may be chosen to reflect greater use or resource administrative needs. Additional maintenance measures could include resurfacing, outslowing, clearing debris from dips and cross drains, armoring of ditches, spot rocking, and drainage improvement.

Maintenance needs will be reflected in an annual road maintenance plan developed to include all roads under Forest Service control. Individual maintenance plans will be developed annually for each timber sale and for each cost share area outlining performance standards, responsibilities, and timing.

For maintenance of roads on active timber sales, the Forest Service and the Purchaser shall annually agree at the beginning of the operating season on an Annual Road Maintenance Plan outlining responsibilities and timing. If the road is subjected to commercial use, the Forest Service may collect deposits to facilitate road maintenance and to equitably assess maintenance cost of each user.

In addition to timely performance of regular maintenance, each Forest should have an emergency action plan which identifies procedures to be used during periods of high runoff to protect facilities and reduce resource damage.

IMPLEMENTATION: The work is controlled through the Forest Engineer who is responsible for the development of the annual road maintenance plan based on condition surveys. Maintenance levels are established for each road and maintenance performed in accordance with standards. On timber sales, maintenance is a Purchaser responsibility and compliance with standards is assured by the Contracting Officer, Engineering Representative, or certified Sale Administrator. On system roads outside of active timber sales, road maintenance is insured by the Engineering Representative or Contracting Officer.

REFERENCES: FSM 7730.2, 7732, and 7735; FSH 2409.15, Timber Sale Administration Handbook and FSH 7709.15, Transportation System Maintenance Handbook; Timber Sale Contract provision C5.4; SWP 11.09; see references in "Best management Practice" Definition (05--2 and 3).

- **PRACTICE: 15.22 - Road Surface Treatment to Prevent Loss of Materials**

OBJECTIVE: To minimize the erosion of road surface materials and consequently reduce the likelihood of sediment production.

EXPLANATION: Unconsolidated road surface material is susceptible to erosion during precipitation events. Likewise, dust derived from road use may settle onto adjacent water bodies. On timber sale roads, the Purchaser shall undertake measures to prevent excessive loss of road material if the need for such action has been identified. Road surface treatments may include: water, dust, oiling, penetration oiling, sealing aggregate surfacing, chip-sealing, or paving.

IMPLEMENTATION: Project location and detailed mitigative measures are developed by an interdisciplinary approach to meet environmental analysis criteria. Forest Service supervisors are responsible for insuring that In-Service projects meet design standards and management requirements. On contracted projects, compliance with contract specifications, and operating plans is assured by the Contracting Officer or Engineering Representative.

REFERENCES: Timber Sale Contract; FSH 2409.15, Timber Sale Administration Handbook.

16 - MINERALS. Minerals (including oil, gas and geothermal resources) exploration and development activities on National Forest System lands fall into generally one of the following categories:

A. **Locatable.** The General Mining Law of 1872, as amended, governs the prospecting for and the appropriation of metallic and most non-metallic minerals with a distinct and special value on National Forest System lands that were reserved from the public domain. This applies to most hard rock and placer mineral deposits.

B. **Leasable.** The Mineral Leasing Act of February 25, 1920, as amended and supplemented, subject certain mineral and energy resources to disposal through leasing actions. These energy and mineral resources include, but are not limited to, coal, oil, gas, geothermal, oil shale, potassium, sodium, and phosphate. The Mineral Leasing Act for Acquired Lands of August 7, 1947, makes all minerals on acquired (purchased) National Forest System lands, unless otherwise reserved or held as outstanding rights, subject to the provisions of the 1920 Minerals Leasing Act.

C. **Common Variety Minerals.** The Materials Act of July 31, 1947, provides for the disposal and use of common variety mineral materials such as sand, stone, gravel, pumice, cinders and clay located on National Forest System lands. Disposal can be by sale or free use permit to private entities or Federal, State, and local units of government, when consistent with good public land management and in the public interest.

- **PRACTICE: 16.01 - Administration of the General Mining Law (Act of May 10, 1872) for Mineral Exploration and Extraction on National Forest System Lands**

OBJECTIVE: To protect water quality from degradation by physical and chemical constituents which may result from mining and associated activities.

EXPLANATION: Six instruments are involved in analyzing and approving locatable mining activities which could affect water quality on National Forest System lands. Instruments d., e., and f. may not be necessary in every case. The instruments are listed in sequential order if all are needed:

- a. Notice of Intent to Operate.
- b. Plan of Operations.
- c. Environmental Analysis.
- d. Special Use Permit(s).
- e. Road Use Permits.
- f. State and/or other Federal Agency permit(s)/Certification.

The Notice of Intent to Operate is required from those who propose to conduct mining related activities which might cause disturbance of surface resources on National Forest System lands. The notice is submitted to the appropriate responsible official, normally the District Ranger. The proposed operations described in the notice must be evaluated by the District Ranger. The proposed operations described in the notice must be evaluated by the District Ranger, who will inform the operator within 15 days after the notice is received that either his operation is exempt from the requirement for an operating plan or one is required. If the District Ranger determines that significant disturbance of surface resources will likely result from the proposed operations, the District Ranger will inform the operator to prepare a Plan of Operations.

A written Plan of Operations is required from all operators who will likely cause a significant disturbance of surface resources. Prior to approval of the Plan of Operations, the operator may be required to furnish a guarantee in the form of an approved surety bond or other security to perform reclamation work. If hazardous material are to be use or generated, documentation that compliance with applicable State or other Federal agency permits/certification have been met is required. The operating plan shall be submitted to the District Ranger who will review the plan and prepare an environmental analysis within 30 days after the receipt of the plan. The environmental analysis either results in the plan of operations not being required, being approved, needing changes or additions, needing more review time (Environmental Assessment) but not exceeding an additional 60 days, or being deferred until an Environmental Impact Statement (EIS) has been prepared and filed by the Forest Service.

Plans of Operation and/or Special Use Permits may be required and issued for construction or reconstruction of roads for access to mining claims or across National Forest system lands on which the operator has no mining claim. However, when an operating plan is required, and does not include access, the plan must be approved prior to issuance of a special use permit regulating access. Special use permits may also be required and issued for water diversions, water transmission facilities, and electric transmission lines needed for mining activities.

Road Use Permits may be required and issued for commercial use of National Forest System roads.

State and/or other Federal Agency Permits/Certification may be required and issued for air quality, water quality, reclamation, disposal and treatment of solid wastes, and so forth. When required, the Forest Service will advise the operator to obtain the appropriate permits or certification. If the proposed operation will involve the use or generation of hazardous substances, the operator will be required to incorporate the permitting requirements of the appropriate regulatory agencies before approval of the Plan of Operations.

IMPLEMENTATION: A Notice of Intent or Plan of Operation is required to be submitted by the operator prior to operations. Preventive measures should be set forth within the notice or plan which will control sediment from land disturbing activities, control chemical seepages from mines and tailings, and prevent and correct hazardous substance spills. Locations for spoil and tailing disposal are also specified. The plan is reviewed by an interdisciplinary team. Any need changes are conveyed to the operator and negotiated prior to final plan approval.

Through the use of the Notice of Intent, Plan of Operations, and provisions in any Special Use Permit issued, the responsible Forest Officer, usually the District Ranger, checks for compliance with prescribed measures. Legal remedies are available if mutual cooperation fails. A court may

grant injunctive or mandatory relief, and award damages to the extent of property damaged. There may be other remedies for violation of Federal, State and local standards for air and water quality and for the disposal of solid wastes.

REFERENCES: 36 CFR 228, 36 CFR 251, and 30 USC 612; NEPA; FSM 1950, 2725, 2726, 2730.3, 2734.3, 7720, 2810, 2817, and 2850; FSH 2809.11, Land Managers Handbook on Minerals Management; FSH 2809.12, Minerals Planning Handbook; SWCP 11.01, 11.02, 11.04, 11.05, 11.06, 11.07, 11.08, 11.11, 11.13, 12.06, 12.07, 12.08, 13.04, 15.01, 15.02, and 15.03.

- **PRACTICE: 16.02 - Administration of Bureau of Land management Issued permits, Licenses, or Leases for Mineral Exploration and Extraction on National Forest System Lands**

OBJECTIVE: To protect soil and water resource values during mineral exploration, extraction, processing and reclamation activities that are conducted on National Forest System lands under the terms of Bureau of Land Management prospecting permits, coal exploration licenses, and mineral leases.

EXPLANATION: Through the NEPA process, the Forest Service (FS) and Bureau of Land Management (BLM) make a determination as to whether or not a permit, license, or lease should be issued by the Bureau of Land Management. The Forest Service and Bureau of Land Management develop the permit, license, or lease stipulations needed to protect water quality and other resource values.

IMPLEMENTATION: Detailed mitigative measures are developed by an interdisciplinary team during the environmental analysis and are written into the special stipulations section of the permit, license, or lease. Conditions of approval are also developed by the interdisciplinary team to be included in the operating plan.

By interdepartmental agreement, all applications to lease lands under Forest Service jurisdiction are referred to the Forest Service for review, recommendations, and development of special stipulations to protect the surface resources. Technical administration of Bureau of Land Management permits, licenses, and leases is the responsibility of the Bureau of Land Management. Therefore, compliance inspections are the responsibility of the Bureau of Land Management unless the Forest Service is authorized to conduct compliance inspections through an interagency agreement or MOU. The Forest Service may inspect and refer situations of non-compliance with operating plans to the Bureau of Land Management for action.

REFERENCES: FSH 2809.11, Land Managers Handbook on Minerals Management; FSH 2809.12, Minerals Planning Handbook; FSM 2725, 2726, 2734, and 2820; Mineral Leasing Act (41 Stat. 437, as amended; 30 USC 181); Federal Coal Leasing Amendments Act (90 Stat. 1083; 30 USC 201 (b) and 207; 16 USC 1276); Act of March 4, 1917 (30 Stat. 1150, as supplemented; 16 USC 520); Section 402 of Reorganization Plan No. 3, of July 16, 1946 (60 Stat. 1097, 1099; 5 USC Appendix); Act of August 7, 1947 (61 Stat. 913; 30 USC 351, 352, 354, 359) as amended by PL 167 and the Geothermal Steam Act (PL 91-581); SWCP 11.01, 11.02, 11.04, 11.05, 11.06, 11.07, 11.08, 11.11, 11.13, 12.06, 12.07, 12.08, 13.04, 15.01, 15.02, and 15.03.

- **PRACTICE: 16.03 - Administration of Common Variety Mineral Operations**

OBJECTIVE: To assure protection of water quality and other resource values when common variety mineral materials are used for both In-Service and Out-Service.

EXPLANATION: Common variety mineral materials such as sand, stone, gravel, pumice, cinders and clay may be disposed of and developed when their use is consistent with good public land management and in the public interest. Use authorizations will require reasonable erosion control, and rehabilitation and revegetation of the surface. Removal may be approved if adequate measures can be accomplished to prevent erosion or stream pollution and satisfactory arrangements can be made for rehabilitation and restoration as outlined here and in SWCP 15.13, 15.1, and 15.17.

IMPLEMENTATION: A project plan or Mineral Material permit identifies the location and conditions of mineral material removal and disposal. Both will be preceded by an environmental analysis. Project location, the scope of the proposal, and detailed mitigative measures are developed using an interdisciplinary approach. The project or permit is approved by the District Ranger or Forest Supervisor. Compliance with the project design standards, the terms and conditions of the permit, and applicable Federal and State regulations is assured by the District Ranger or Forest Service representative.

REFERENCES: 36 CFR 228, Subpart C; FSM 2725, 2726, 2734, 2814, 2817, and 2850; FSH 2809.13, Minerals Program Handbook; FSH 7709.11, Transportation Engineering Handbook; Act of July 31, 1947 (61 Stat. 681), as amended by the Act of August 31, 1950 (64 Stat. 571), and the Act of July 23, 1955 (60 Stat. 367; 30 USC 601-603), and pursuant to the Act of June 11, 1960 (74 Stat. 205), and the Act of September 25, 1962 (76 Stat. 587); SWCP 11.04, 11.05, 11.07, 11.08, 15.01, 15.02, 15.03, 15.13, 15.14, and 15.17.

- **PRACTICE: 16.04 - Permits and Administration of Geophysical Operations**

OBJECTIVE: To protect the quality of surface and ground water from degradation resulting from geophysical activities on National Forest System lands.

EXPLANATION: Geophysical activities will be managed in a manner that is both timely and offers protection to other multiple use values and management objectives. Many activities have no effects. However, if effects are identified, standard seismic hole plugging procedures will be followed to prevent contamination of ground water resources, and shot hole placement will be examined for potential impacts to other resource values (SWCP 11.10). New road construction, if allowed, will be located, constructed, and maintained to protect the soil and water resources (SWCP 15.01, 15.02, and 15.03).

IMPLEMENTATION: During the environmental analysis, an interdisciplinary team will be assembled to prepare the appropriate NEPA document that evaluates potential impacts, including cumulative, and any needed mitigation measures for the geophysical prospecting permit. The use of water resources for the prospecting activities may require non-Forest Service authorizations or permits.

REFERENCES: Organic Act of 1897 (30 Stat. 34, as amended, 16 USC 472, 475-478, 480-482, 551); Multiple Use-Sustained-Yield Act of 1960 (74 Stat. 215, 16 USC 528-531); RPA, as amended (88 Stat. 476; 16 USC 1600-16140; FSM 2860; FSH 2809.13, Minerals program

Handbook; In R-1: A Procedural Guide for Oil and Gas Administration , USDA-Forest Service, R-1, Custer NF; SWCP 11.01, 11.07, 11.08, 11.10, 13.04, 15.01, 15.02, and 15.03.

- **PRACTICE: 16.05 - Mineral Activity Coordination Analysis**

OBJECTIVE: To protect the soil and water resource from degradation during development of minerals resources.

EXPLANATION: One essential function of a minerals management program is to forecast what, where, and when mineral activity will occur. While the Forest Service has limited ability to control the pace and location of mineral development, the Forest Service has the authority to influence the process considerably. The Activity Coordination Analysis approach for mineral exploration, development and production is a prudent approach that assists in minimizing adverse impacts to the soil, water, and other resources.

IMPLEMENTATION: The specific land area requiring an Activity Coordination Analysis will be identified. This will necessitate the delineation of the study area based on typical oil and gas spacing intervals, pipeline, primary and alternative recovery installation locations, directional drilling opportunities, sensitive areas for water and other resources, and other environmental concerns. An interdisciplinary team will collect and analyze data, prepare an environmental analysis, and develop a management design that will best mitigate impacts to soil and water resources as well as other resource values. Technical staffs familiar with the components of construction, development, and production of an oil and gas field will be utilized.

REFERENCES: In R-1: A Procedural Guide for Oil and Gas Administration, USDA-Forest Service, R-1, Custer NF; FSH 2809.13, Minerals Program Handbook: NEPA; SWCP 11.01, 11.02, 11.04, 11.05, 11.07, 11.10, 11.11, 13.04, 15.01, 15.02, and 15.03.



APPENDIX C

AIR QUALITY

PAGES 1 – 14: NOTICE OF INTENT

PAGES 15 – 25: APPROVAL ORDER

PAGES 26 – 55: SUMMARY OF CRITERIA EMISSIONS



APPENDIX C

UTAH DIVISION OF AIR QUALITY SOURCE PLAN REVIEW

Brian Harris
Sunroc Corporation
730 North 1500 West
Orem, UT 84057

Project Number: N130720006A

RE: Modification to Approval Order DAQE-AN0130720005-
10 to Add Equipment, Update Emissions, and Change
Drilling and Blasting Limitations
Juab County; CDS B; MACT (Part 63), NSPS (Part 60),
Attainment Area, Title V (Part 70) Area Source,

Review Engineer: Mr. Alan Humpherys
Date: July 27, 2012

Notice of Intent Submitted: August 22, 2011

Plant Contact: Brian Harris
Phone Number: (801) 802-6954
Fax Number: (801) 226-4247

Source Location: One-Third Mile East of the, Mouth of Chicken Creek
Canyon, Levan, UT
Juab County
4,378,000 m Northing, 428,900 m Easting, UTM Zone 12
UTM Datum: NAD27

DAQ requests that a company/corporation official read the attached draft/proposed Plan Review with Recommended Approval Order Conditions. If this person does not understand or does not agree with the conditions, the review engineer should be contacted within five days after receipt of the Plan Review. If this person agrees with the Plan Review and Recommended Approval Order Conditions, this person should sign below and return (FAX # 801-536-4099) within 10 days after receipt of the conditions. If the review engineer is not contacted within 10 days, the review engineer shall assume that the company/corporation official agrees with this Plan Review and will process the Plan Review towards final approval. A public comment period will be required before the Approval Order can be issued.

Applicant Contact

Brian Harris Aug 1, 2012
(Signature & Date)



APPENDIX C

UTAH DIVISION OF AIR QUALITY SOURCE PLAN REVIEW

Brian Harris
Sunroc Corporation
730 North 1500 West
Orem, UT 84057

Project Number: N130720006A

RE: Modification to Approval Order DAQE-AN0130720005-10 to Add Equipment, Update Emissions, and Change Drilling and Blasting Limitations
Juab County; CDS B; MACT (Part 63), NSPS (Part 60), Attainment Area, Title V (Part 70) Area Source,

Review Engineer: Mr. Alan Humpherys
Date: July 27, 2012

Notice of Intent Submitted: August 22, 2011

Plant Contact: Brian Harris
Phone Number: (801) 802-6954
Fax Number: (801) 226-4247

Source Location: One-Third Mile East of the, Mouth of Chicken Creek
Canyon, Levan, UT
Juab County
4,378,000 m Northing, 428,900 m Easting, UTM Zone 12
UTM Datum: NAD27

DAQ requests that a company/corporation official read the attached draft/proposed Plan Review with Recommended Approval Order Conditions. If this person does not understand or does not agree with the conditions, the review engineer should be contacted within five days after receipt of the Plan Review. If this person agrees with the Plan Review and Recommended Approval Order Conditions, this person should sign below and return (FAX # 801-536-4099) within 10 days after receipt of the conditions. If the review engineer is not contacted within 10 days, the review engineer shall assume that the company/corporation official agrees with this Plan Review and will process the Plan Review towards final approval. A public comment period will be required before the Approval Order can be issued.

Applicant Contact _____
(Signature & Date)



APPENDIX C

ABSTRACT

Sunroc Corporation has requested a modification to AO DAQE-AN0130720005-10, dated November 22, 2010 to add a diesel storage tank, change the drilling and blasting conditions, update PM₁₀ emission estimates, and include GHG emissions. The plant consists of two operational areas, approximately one mile apart, called the West Pit and the East Pit. Operations in the winter months typically occur in the East Pit, and operations in the summer months typically occur in the West Pit. Only one pit operates at a time.

The source is located near Levan in Juab County, which is an attainment area of the NAAQS for all pollutants. NSPS 40 CFR 60 Subpart A, Subpart OOO, and Subpart IIII and MACT 40 CFR 63 Subpart A and Subpart ZZZZ regulations apply to this source. 40 CFR 61 regulations do not apply to this source. Title V of the 1990 Clean Air Act applies to this source, and this source is considered a Title V Area Source.

The potential emissions, in tons per year, will change as follows: PM₁₀ + 2.62 (which includes PM_{2.5}), PM_{2.5} + 2.13, NO_x - 2.42, SO₂ - 0.28, CO - 9.54, and CO_{2e} + 1,900 (not previously accounted for).

The proposed controlled potential to emit emissions, in tons per year, will be as follows: PM₁₀ = 9.95 (which includes PM_{2.5}), PM_{2.5} = 4.95, NO_x = 44.26, SO₂ = 1.55, CO = 13.90, and VOC = 1.93, HAPs = 0.03, and CO_{2e} = 1,900.

SOURCE SPECIFIC DESIGNATIONS

Applicable Programs:

NSPS (Part 60), Subpart A: General Provisions applies to Chicken Creek Gypsum Processing Plant
NSPS (Part 60), Subpart OOO: Standards of Performance for Nonmetallic Mineral Processing Plants applies to Miscellaneous Aggregate Processing Equipment
NSPS (Part 60), Subpart OOO: Standards of Performance for Nonmetallic Mineral Processing Plants applies to One (1) Primary Crusher
NSPS (Part 60), Subpart OOO: Standards of Performance for Nonmetallic Mineral Processing Plants applies to One (1) Self-Powered Crusher
NSPS (Part 60), Subpart OOO: Standards of Performance for Nonmetallic Mineral Processing Plants applies to One (1) Self-Powered Screen
NSPS (Part 60), Subpart OOO: Standards of Performance for Nonmetallic Mineral Processing Plants applies to Two (2) Screens
NSPS (Part 60), Subpart IIII: Standards of Performance for Stationary Compression Ignition Internal Combustion Engines applies to One (1) Self-Powered Crusher Engine
NSPS (Part 60), Subpart IIII: Standards of Performance for Stationary Compression Ignition Internal Combustion Engines applies to One (1) Self-Powered Screen Engine
MACT (Part 63), Subpart A: General Provisions applies to Chicken Creek Gypsum Processing Plant
MACT (Part 63), Subpart ZZZZ: National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines applies to One (1) 725 kW Diesel Generator
MACT (Part 63), Subpart ZZZZ: National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines applies to One (1) Self-Powered Crusher Engine

Engineering Review N130720006: Sunroc Corporation: Chicken Creek Gypsum Processing Plant - Modification to Approval Order DAQE-AN0130720005-10 to Add Equipment, Update Emissions, and Change Drilling and Blasting Limitations
July 27, 2012
Page 2



APPENDIX C

MACT (Part 63), Subpart ZZZZ: National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines applies to One (1) Self-Powered Screen Engine Attainment Area applies to Chicken Creek Gypsum Processing Plant
Title V (Part 70) area source applies to Chicken Creek Gypsum Processing Plant

Permit History:

When issued, the approval order shall supersede or will be based on the following documents:

Supersedes	DAQE-AN0130720005-10 dated November 22, 2010
Is Derived From	Proposed Modification Letter dated August 22, 2011
Is Derived From	NOI dated December 20, 2011
Is Derived From	Additional Information dated January 31, 2012

SUMMARY OF NOTICE OF INTENT INFORMATION

Description of Proposal:

Sunroc Corporation has requested to add a 12,000-gallon diesel storage tank to the facility. Due to the low vapor pressure of diesel fuel and the low throughput volume of the tank, annual VOC emissions are estimated to be less than 0.01 tons per year. The previous permit did not include GHG emission estimates. This permit will include GHG emissions. GHG emissions are generated from the generators and blasting operations on site. The GHG emission rate will be 1,900 tons per year, which is below the major source threshold for GHGs.

Sunroc Corporation has requested to change the limitations and recordkeeping requirements for the drilling and blasting operations on site. The current permit requires the source to measure the area of each blast and the number of holes drilled for each blast. These two variables are then put into AP-42's emission factor calculation to estimate the PM₁₀ emissions for each blast. The total PM₁₀ emissions from drilling and blasting are limited to 0.82 tons per year. Sunroc Corporation has requested to increase this amount to 2.03 tons per year with only recording the number of blasts per year. Sunroc Corporation has estimated PM₁₀ drilling and blasting emissions using reasonable assumptions that generate the highest amount of PM₁₀ emissions. The maximum number of blasts will be 50 blasts per year. The amount of ANFO used will also be reduced from 410 tons per year to 125 tons per year.

The previous permit had used emission factors from older versions of AP-42. These emission factors have been updated and are reflected in the potential to emit totals.

Permit condition II.B.4.d requires that the sulfur content in diesel fuel used in the stationary diesel engines meet the limits in 40 CFR 63.6604. Currently 40 CFR 63.6604 requires the sulfur content not exceed 15 ppm. Condition II.B.4.d has been updated to reflect the specific sulfur content of 15 ppm.

Permit condition II.B.3.a was modified to only include an opacity limit only on haul roads and operational areas. An opacity limit on other fugitive sources (storage piles, exposed areas, etc.) was moved to a new condition (II.B.3.d). The reason for this is that the monitoring requirements in II.B.3.a.1 are only applicable when mobile equipment are creating fugitive dust and do not apply to the other fugitive sources. The condition was split to represent that.

Engineering Review N130720006: Sunroc Corporation: Chicken Creek Gypsum Processing Plant - Modification to Approval Order DAQE-AN0130720005-10 to Add Equipment, Update Emissions, and Change Drilling and Blasting Limitations
July 27, 2012
Page 3



APPENDIX C

Permit conditions II.B.3.b and II.B.5.e were slightly modified. The conditions' language was clarified to explain that the application of water may stop when the temperature is below freezing, but the opacity limits must still be met when the temperature is below freezing.

Sunroc Corporation has requested to remove previous permit condition II.B.3.c. This condition stated: "The haul road shall be graded to remove the excess gypsum as necessary or as requested by the Executive Secretary in order to meet the opacity limitations in this AO. [R307-401-8]" Sunroc re-estimated emissions from the haul roads and operational areas using a control of road-base and watering. With this control the requirement to grade will be removed and the requirement to install road-base and apply water will be added.

Summary of Emission Totals:

The emissions listed below are an estimate of the total potential emissions from the source. Some rounding of emissions is possible.

Estimated Criteria Pollutant Potential Emissions

CO ₂ Equivalent	1900.00	tons/yr
Carbon Monoxide	13.90	tons/yr
Nitrogen Oxides	44.26	tons/yr
Particulate Matter - PM ₁₀	9.92	tons/yr
Particulate Matter - PM _{2.5}	4.95	tons/yr
Sulfur Dioxide	1.55	tons/yr
Volatile Organic Compounds	1.93	tons/yr

Estimated Hazardous Air Pollutant Potential Emissions

Total hazardous air pollutants	60	lbs/yr
--------------------------------	----	--------

Review of Best Available Control Technology:

1. BACT review regarding Source-Wide
Storage Tank - The emissions from the diesel storage tank are small enough that add-on controls would be too expensive for the amount of emissions controlled. Therefore, normal operation and maintenance is considered BACT for the diesel storage tank.

Drilling and Blasting - Emissions from drilling and blasting are small enough that additional controls would be too expensive for the amount of emissions controlled. Therefore, BACT for drilling and blasting is the same as it was when the previous permit was issued. BACT for drilling is placing a shroud over the drill when conducting drilling operations. BACT for blasting is utilizing PM₁₀ controls listed in R307-205 when conducting blasting operations to reduce emissions.

Haul Roads - A previous BACT determination for haul roads was grading and application of water when necessary. To avoid grading, Sunroc Corporation has elected to increase the control of the haul roads and operational areas by applying road-base and using water application to control emissions.

Since no other changes are being made at the facility, a BACT analysis for the other processes and equipment on site was not performed at this time. [Last updated July 27, 2012]

Engineering Review N130720006: Sunroc Corporation: Chicken Creek Gypsum Processing Plant - Modification to Approval Order DAQE-AN0130720005-10 to Add Equipment, Update Emissions, and Change Drilling and Blasting Limitations

July 27, 2012
Page 4



APPENDIX C

RECOMMENDED APPROVAL ORDER CONDITIONS

The intent is to issue an air quality Approval Order (AO) authorizing the project with the following recommended conditions and that failure to comply with any of the conditions may constitute a violation of the AO. The AO will be issued to and will apply to the following:

Name of Permittee:

Sunroc Corporation
730 North 1500 West
Orem, UT 84057

Permitted Location:

Sunroc Corporation:
Chicken Creek Gypsum Processing Plant
One-Third Mile East of the
Mouth of Chicken Creek Canyon
Levan, UT 84639

UTM coordinates: 428,900 m Easting, 4,378,000 m Northing, UTM Zone 12
SIC code: 1499 (Miscellaneous Nonmetallic Minerals, Except Fuels)

Section I: GENERAL PROVISIONS

- L.1 All definitions, terms, abbreviations, and references used in this AO conform to those used in the UAC R307 and 40 CFR. Unless noted otherwise, references cited in these AO conditions refer to those rules. [R307-101]
- L.2 The limits set forth in this AO shall not be exceeded without prior approval. [R307-401]
- L.3 Modifications to the equipment or processes approved by this AO that could affect the emissions covered by this AO must be reviewed and approved. [R307-401-1]
- L.4 All records referenced in this AO or in other applicable rules, which are required to be kept by the owner/operator, shall be made available to the Director or Director's representative upon request, and the records shall include the two-year period prior to the date of the request. Unless otherwise specified in this AO or in other applicable state and federal rules, records shall be kept for a minimum of two (2) years. [R307-401-8]
- L.5 At all times, including periods of startup, shutdown, and malfunction, owners and operators shall, to the extent practicable, maintain and operate any equipment approved under this AO, including associated air pollution control equipment, in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Director which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source. All maintenance performed on equipment authorized by this AO shall be recorded. [R307-401-4]
- L.6 The owner/operator shall comply with R307-150 Series. Inventories, Testing and Monitoring. [R307-150]
- L.7 The owner/operator shall comply with UAC R307-107. General Requirements: Unavoidable Breakdowns. [R307-107]

Engineering Review N130720006: Sunroc Corporation: Chicken Creek Gypsum Processing Plant - Modification to Approval Order DAQE-AN0130720005-10 to Add Equipment, Update Emissions, and Change Drilling and Blasting Limitations
July 27, 2012
Page 5



APPENDIX C

Section II: SPECIAL PROVISIONS

- II.A The approved installations shall consist of the following equipment:**
- II.A.1 Chicken Creek Gypsum Processing Plant**
 - II.A.2 One (1) Primary Crusher**
Capacity: 450 tons/hour
Manufacture Date: 1988
 - II.A.3 One (1) Self-Powered Crusher**
Capacity: 450 tons/hour
Manufacture Date: 2006
 - II.A.4 Two (2) Screens**
Capacity: 600 tons/hour each
Manufacture Date: 1988 & Prior to 2008
 - II.A.5 One (1) Self-Powered Screen**
Capacity: 500 tons/hour
Manufacture Date: 2007
 - II.A.6 Miscellaneous Aggregate Processing Equipment**
Includes: grizzlies, feeders, splitters, traps, load bins, conveyors, screws, cyclones, clarifiers, and stackers
Manufactured Prior to 2008
 - II.A.7 One (1) 725 kW Diesel Generator**
Rated Capacity: 972.23 hp
Manufacture Date: 1999
 - II.A.8 One (1) Self-Powered Crusher Engine**
Rated Capacity: 245 hp
Manufacture Date: 2006
 - II.A.9 One (1) Self-Powered Screen Engine**
Rated Capacity: 130 hp
Manufacture Date: 2007
 - II.A.10 One (1) 12,000-gallon Storage Tank (new)**
Contents: Diesel Fuel
 - II.A.11 Various Small Storage Tanks**
Contents: Fuel Oil and Diesel Fuel
Listed for informational purposes only.



APPENDIX C

- II.A.12 Various Off highway Vehicles**
Includes: Front-end loaders, bulldozers, scrapers, draglines, track-hoes, haul trucks, water trucks, sweeper truck, forklift trucks, boom trucks, etc.
Listed for informational purposes only.
- II.A.13 Miscellaneous Equipment**
Includes: welders, pumps, motors, pressure washers, parts washers, drilling equipment, blasting equipment, and other equipment associated with construction materials processing, manufacture, and maintenance.
Listed for informational purposes only.
- II.B Requirements and Limitations**
- II.B.1 The Chicken Creek Gypsum Processing Plant shall be subject to the following:**
- II.B.1.a** Sunroc Corporation shall notify the Director in writing when the 12,000-gallon Storage Tank has been installed and is operational. To ensure proper credit when notifying the Director, send your correspondence to the Director, attn: Compliance Section.
- If the owner/operator has not notified the Director in writing within 18 months from the date of this AO on the status of the construction and/or installation, the Director shall require documentation of the continuous construction and/or installation of the operation. If a continuous program of construction and/or installation is not proceeding, the Director may revoke the AO. [R307-401-18]
- II.B.1.b** The owner/operator shall conduct its operations either at the East Pit or at the West Pit at the Chicken Creek site. Operations may occur at either pit, but the owner/operator shall not conduct operations at both pits at the same time. [R307-401-8]
- II.B.1.c** The owner/operator shall not exceed 16 hours of operation per day (from midnight to midnight) at the Chicken Creek Gypsum Processing Plant. [R307-401-8]
- II.B.1.c.i** Hours of operation shall be determined by supervisor monitoring and maintaining of an operations log. Records of daily hours of operation shall include the following:
- A. The date
 - B. The time operations began at the facility
 - C. The time operations ended at the facility
 - D. The total daily hours of operation at the facility
- [R307-401-8]
- II.B.1.d** The owner/operator shall not produce more than 150,000 tons of aggregate material per rolling 12-month period and shall not produce more than 4,800 tons of aggregate material per day. [R307-401-8]



APPENDIX C

- II.B.1.d.1 To determine compliance with a rolling 12-month total, the owner/operator shall calculate a new 12-month total for each day of the previous month by the twentieth day of each month using data from the previous 12 months. Records of production shall be kept for all periods when the plant is in operation. Production shall be determined by belt scale records, scale house records or vendor receipts. The records of production shall be kept on a daily basis. [R307-401-8]
- II.B.1.d.2 The owner/operator shall weigh and account for all aggregate material prior to the aggregate material leaving the site or being used elsewhere on site. [R307-401-8]
- II.B.1.e Unless otherwise specified in this AO, the owner/operator shall not allow visible emissions from any source on site to exceed 20 percent opacity. [R307-201-3]
- II.B.1.e.1 Unless otherwise specified in this AO, opacity observations of emissions from stationary sources shall be conducted according to 40 CFR 60, Appendix A, Method 9. [R307-201-3]
- II.B.2 **All Drilling and Blasting Operations on site shall be subject to the following:**
- II.B.2.a The owner/operator shall install and use a shroud on all aggregate drills when drilling to control fugitive emissions. [R307-401-8]
- II.B.2.b The owner/operator shall not use more than 125 tons of explosives per rolling 12-month period. [R307-401-8]
- II.B.2.b.1 To determine compliance with a rolling 12-month total, the owner/operator shall calculate a new 12-month total for each day of the previous month by the twentieth day of each month using data from the previous 12 months. Amount of explosives used shall be determined by purchasing records or maintaining an operations log. [R307-401-8]
- II.B.2.c The owner/operator shall not blast more than 50 blasts per rolling 12-month period. [R307-401-8]
- II.B.2.c.1 To determine compliance with a rolling 12-month total, the owner/operator shall calculate a new 12-month total by the twentieth day of each month using data from the previous 12 months. Number of blasts shall be determined by supervisor monitoring and maintaining of an operations log. [R307-401-8]
- II.B.3 **All Haul Roads and Fugitive Dust Sources shall be subject to the following:**
- II.B.3.a The owner/operator shall not allow visible emissions from haul roads and operational areas on site to exceed 20 percent opacity. [R307-205-4]
- II.B.3.a.1 Visible emission determinations for fugitive dust emissions from haul-road traffic and mobile equipment in operational areas shall use procedures similar to Method 9. The normal requirement for observations to be made at 15-second intervals over a six-minute period, however, shall not apply. Visible emissions shall be measured at the densest point of the plume but at a point not less than 1/2 vehicle length behind the vehicle and not less than 1/2 the height of the vehicle. [R307-205-4]



APPENDIX C

- II.B.3.b The owner/operator shall cover all haul roads, loader routes, and wheeled-vehicle operational areas with road-base material and shall use water application to maintain opacity limits listed in this AO. The owner/operator may stop applying water to the haul roads, loader routes, and wheeled-vehicle operational areas when the temperature is below freezing but shall still maintain the opacity limits listed in this AO. [R307-401-8]
- II.B.3.b.1 Records of water application shall be kept for all periods when the plant is in operation. The records shall include the following items:
- A. Date and time treatments were made
 - B. Number of treatments made and quantity of water applied
 - C. Rainfall amount received, if any
 - D. Records of temperature, if the temperature is below freezing
- [R307-401-8]
- II.B.3.c The owner/operator shall not allow visible emissions from any fugitive dust source (storage piles, exposed areas, etc.) on site, other than haul roads and operational areas, to exceed 20 percent opacity. [R307-205-4]
- II.B.3.d The owner/operator shall comply with a FDCP acceptable to the Director for control of all dust sources associated with the Chicken Creek Gypsum Processing Plant. The haul road speed of 15 miles per hour shall be posted. [R307-401-8]
- II.B.3.e The owner/operator shall comply with all applicable requirements of R307-205 for Fugitive Emission and Fugitive Dust sources on site. [R307-205]
- II.B.4 **All Diesel Engines on site shall be subject to the following:**
- II.B.4.a The 725 kW Generator shall not exceed 2,430,575 horsepower-hours (hp-hrs) of operation per rolling 12-month period. [R307-401-8]
- II.B.4.a.1 To determine compliance with a rolling 12-month total, the owner/operator shall calculate a new 12-month total for each day of the previous month by the twentieth day of each month using data from the previous 12 months. To determine the hp-hrs for the generator, the owner/operator shall multiply the horsepower of the engine and the hours operated for each day. Hours of operation shall be determined by supervisor monitoring and maintaining of an operations log. [R307-401-8]
- II.B.4.b The Self-Powered Crusher Engine and Self-Powered Screen Engine shall not exceed 905,000 hp-hrs of operation combined per rolling 12-month period. [R307-401-8]
- II.B.4.b.1 To determine compliance with a rolling 12-month total, the owner/operator shall calculate a new 12-month total for each day of the previous month by the twentieth day of each month using data from the previous 12 months. To determine the hp-hrs for the generators, the owner/operator shall multiply the horsepower of the engine and the hours operated for that engine for each day and add the total hp-hrs together. Hours of operation shall be determined by supervisor monitoring and maintaining of an operations log. [R307-401-8]

Engineering Review N130720006: Sunroc Corporation: Chicken Creek Gypsum Processing Plant - Modification to Approval Order DAQE-AN0130720005-10 to Add Equipment, Update Emissions, and Change Drilling and Blasting Limitations

July 27, 2012
Page 9



APPENDIX C

- II.B.4.c The owner/operator shall not allow visible emissions from any diesel engine on site to exceed 20 percent opacity. [R307-201-3]
- II.B.4.d The sulfur content of any diesel fuel burned in any stationary diesel engine on site shall not exceed 15 ppm. [40 CFR 63 Subpart ZZZZ]
- II.B.4.d.1 The sulfur content shall be determined by ASTM Method D2880-71, D4294-89, or approved equivalent. Certification of diesel fuel shall be either by the owner/operator's own testing or by test reports from the diesel fuel marketer. [R307-203-1]
- II.B.5 **All Crushers, Screens, and Conveyors on site shall be subject to the following:**
- II.B.5.a The owner/operator shall not allow visible emissions from any crusher on site to exceed 15 percent opacity. [40 CFR 60 Subpart OOO]
- II.B.5.b The owner/operator shall not allow visible emissions from any screen on site to exceed 10 percent opacity. [40 CFR 60 Subpart OOO]
- II.B.5.c The owner/operator shall not allow visible emissions from any conveyor transfer point on site to exceed 10 percent opacity. [40 CFR 60 Subpart OOO]
- II.B.5.d The owner/operator shall not allow visible emissions from any conveyor drop point on site to exceed 20 percent opacity. [R307-205-4]
- II.B.5.e The owner/operator shall install water sprays on all crushers, all screens, and all unenclosed conveyor transfer points on site to control fugitive emissions. Sprays shall operate as required when the temperature is above freezing to maintain the opacity limits listed in this AO. [R307-401-8]
- II.B.5.f The owner/operator shall conduct an initial performance test for all crushers, screens, and conveyor transfer points on site within 60 days after achieving the maximum production rate but not later than 180 days after initial startup. Performance tests shall meet the limitations specified in Table 3 to Subpart OOO. Records of initial performance tests shall be kept and maintained on site for the life of the equipment. [40 CFR 60 Subpart OOO]
- II.B.5.f.1 Initial performance tests for fugitive emissions limits shall be conducted according to 40 CFR 60.675(c). The owner or operator may use methods and procedures specified in 40 CFR 60.675(e) as alternatives to the reference methods and procedures specified in 40 CFR 60.675(c). [40 CFR 60 Subpart OOO]
- II.B.5.f.2 The owner/operator shall submit written reports to the Director of the results of all performance tests conducted to demonstrate compliance with the standards set forth in 40 CFR 60.672. [40 CFR 60 Subpart OOO]



APPENDIX C

Section III: APPLICABLE FEDERAL REQUIREMENTS

In addition to the requirements of this AO, all applicable provisions of the following federal programs have been found to apply to this installation. This AO in no way releases the owner or operator from any liability for compliance with all other applicable federal, state, and local regulations including UAC R307.

NSPS (Part 60), A: General Provisions

NSPS (Part 60), OOO: Standards of Performance for Nonmetallic Mineral Processing Plants

NSPS (Part 60), IIII: Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

MACT (Part 63), A: General Provisions

MACT (Part 63), ZZZZ: National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

Title V (Part 70) area source



APPENDIX C

REVIEWER COMMENTS

The AO will be based on the following documents:

Supersedes	DAQE-AN0130720005-10 dated November 22, 2010
Is Derived From	Proposed Modification Letter dated August 22, 2011
Is Derived From	NOI dated December 20, 2011
Is Derived From	Additional Information dated January 31, 2012

1. Comment regarding previous permits:
This permit will supersede:
DAQE-AN0130720005-10 dated November 22, 2010, which replaced:
DAQE-AN0130720004-09 dated July 14, 2009, which replaced:
DAQE-AN3072001-05 dated April 29, 2005. [Last updated July 27, 2012]
2. Comment regarding Haul Road Emissions:
The most recent version of the NOI had a total PM_{10} emission rate of 10.19 tpy and a total $PM_{2.5}$ emission rate of 4.97 tpy. The haul roads emissions for PM_{10} were 2.88 tpy and for $PM_{2.5}$ were 0.29 tpy. The loader route emissions for PM_{10} were 0.72 tpy and for $PM_{2.5}$ were 0.07 tpy. The previous AO had PM_{10} modeling performed for the haul roads and loader routes. The PM_{10} emission rate that was transferred into the model was 4.04 tpy for the haul roads and loader routes. The corresponding $PM_{2.5}$ emission rate was 0.40 tpy for the haul roads and loader routes. For this application, the modeled emission rates were used instead of the emission rates submitted with the NOI; however, the application included additional controls (road-base and watering) of the haul roads and loader routes. This equates to a PM_{10} emission rate of 3.36 tpy and a $PM_{2.5}$ emission rate of 0.34 tpy based from emission rates used in the model. The difference from the NOI to those listed in this engineering review is -0.24 tpy for PM_{10} and -0.02 tpy for $PM_{2.5}$. This results in a total emission rate of 9.95 tpy for PM_{10} and 4.95 tpy for $PM_{2.5}$. [Last updated July 27, 2012]



APPENDIX C

ACRONYMS

The following lists commonly used acronyms and associated translations as they apply to this document:

40 CFR	Title 40 of the Code of Federal Regulations
AO	Approval Order
BACT	Best Available Control Technology
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CDS	Classification Data System (used by EPA to classify sources by size/type)
CEM	Continuous emissions monitor
CEMS	Continuous emissions monitoring system
CFR	Code of Federal Regulations
CMS	Continuous monitoring system
CO	Carbon monoxide
CO ₂	Carbon Dioxide
CO ₂ e	Carbon Dioxide Equivalent - 40 CFR Part 98, Subpart A, Table A-1
COM	Continuous opacity monitor
DAQ	Division of Air Quality (typically interchangeable with UDAQ)
DAQE	This is a document tracking code for internal UDAQ use
EPA	Environmental Protection Agency
FDCP	Fugitive dust control plan
GHG	Greenhouse Gas(es) - 40 CFR 52.21 (b)(49)(i)
GWP	Global Warming Potential - 40 CFR Part 86.1818-12(a)
HAP or HAPs	Hazardous air pollutant(s)
ITA	Intent to Approve
LB/HR	Pounds per hour
MACT	Maximum Achievable Control Technology
MMBTU	Million British Thermal Units
NAA	Nonattainment Area
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOI	Notice of Intent
NO _x	Oxides of nitrogen
NSPS	New Source Performance Standard
NSR	New Source Review
PM ₁₀	Particulate matter less than 10 microns in size
PM _{2.5}	Particulate matter less than 2.5 microns in size
PSD	Prevention of Significant Deterioration
PTE	Potential to Emit
R307	Rules Series 307
R307-401	Rules Series 307 - Section 401
SO ₂	Sulfur dioxide
Title IV	Title IV of the Clean Air Act
Title V	Title V of the Clean Air Act
TPY	Tons per year
UAC	Utah Administrative Code
UDAQ	Utah Division of Air Quality (typically interchangeable with DAQ)
VOC	Volatile organic compounds

Engineering Review N130720006: Sunroc Corporation: Chicken Creek Gypsum Processing Plant - Modification to Approval Order DAQE-AN0130720005-10 to Add Equipment, Update Emissions, and Change Drilling and Blasting Limitations

July 27, 2012

Page 13



APPENDIX C



State of Utah

GARY R. HERBERT
Governor

GREG BELL
Lieutenant Governor

Department of Environmental Quality

Amanda Smith
Executive Director

DIVISION OF AIR QUALITY
Bryce C. Bird
Director

FILE

DAQE-AN130720006-12

September 24, 2012

Brian Harris
Sunroc Corporation
730 North 1500 West
Orem, UT 84057

Dear Mr. Harris:

Re: Approval Order: Modification to Approval Order DAQE-AN0130720005-10 to Add Equipment,
Update Emissions, and Change Drilling and Blasting Limitations
Project Number: N13072-0006

The attached document is the Approval Order for the above-referenced project. Future correspondence on this Approval Order should include the engineer's name as well as the DAQE number as shown on the upper right-hand corner of this letter. The project engineer for this action is Mr. Alan Humpherys, who may be reached at (801) 536-4142.

Sincerely,

Bryce C. Bird
Director

BCB:AH:sa

cc: Central Utah Health Department



FILE

STATE OF UTAH

Department of Environmental Quality

Division of Air Quality

**APPROVAL ORDER: Modification to Approval Order DAQE-
AN0130720005-10 to Add Equipment, Update Emissions, and
Change Drilling and Blasting Limitations**

Prepared By: Mr. Alan Humpherys, Engineer
Phone: (801) 536-4142
Email: ahumpherys@utah.gov

APPROVAL ORDER NUMBER

DAQE-AN130720006-12

Date: September 24, 2012

**Sunroc Corporation
Chicken Creek Gypsum Processing Plant
Source Contact:
Brian Harris, Environmental Contact
Phone: (801) 802-6954**

A handwritten signature in black ink, appearing to read 'Bryce C. Bird'.

**Bryce C. Bird
Director**



APPENDIX C

Abstract

Sunroc Corporation has requested a modification to AO DAQE-AN0130720005-10, dated November 22, 2010, to add a diesel storage tank, change the drilling and blasting conditions, update PM₁₀ emission estimates, and include GHG emissions. The plant consists of two operational areas, approximately one mile apart, called the West Pit and the East Pit. Operations in the winter months typically occur in the East Pit, and operations in the summer months typically occur in the West Pit. Only one pit operates at a time.

The source is located near Levan in Juab County, which is an attainment area of the NAAQS for all pollutants. NSPS 40 CFR 60 Subpart A, Subpart OOO, and Subpart IIII and MACT 40 CFR 63 Subpart A and Subpart ZZZZ regulations apply to this source. 40 CFR 61 regulations do not apply to this source. Title V of the 1990 Clean Air Act applies to this source, and this source is considered a Title V Area Source.

The potential emissions, in tons per year, will change as follows: PM₁₀ + 2.62 (which includes PM_{2.5}), PM_{2.5} + 2.13, NO_x - 2.42, SO₂ - 0.28, CO - 9.54, and CO₂e + 1,900 (not previously accounted for).

The proposed controlled potential to emit emissions, in tons per year, will be as follows: PM₁₀ = 9.95 (which includes PM_{2.5}), PM_{2.5} = 4.95, NO_x = 44.26, SO₂ = 1.55, CO = 13.90, and VOC = 1.93, HAPs = 0.03, and CO₂e = 1,900.

This air quality AO authorizes the project with the following conditions and failure to comply with any of the conditions may constitute a violation of this order. This AO is issued to, and applies to the following:

Name of Permittee:

Sunroc Corporation
730 North 1500 West
Orem, UT 84057

Permitted Location:

Chicken Creek Gypsum Processing Plant
One-Third Mile East of the
Mouth of Chicken Creek Canyon
Levan, UT 84639

UTM coordinates: 428,900 m Easting, 4,378,000 m Northing, UTM Zone 12
SIC code: 1499 (Miscellaneous Nonmetallic Minerals, Except Fuels)

Section I: GENERAL PROVISIONS

- I.1 All definitions, terms, abbreviations, and references used in this AO conform to those used in the UAC R307 and 40 CFR. Unless noted otherwise, references cited in these AO conditions refer to those rules. [R307-101]
- I.2 The limits set forth in this AO shall not be exceeded without prior approval. [R307-401]
- I.3 Modifications to the equipment or processes approved by this AO that could affect the emissions covered by this AO must be reviewed and approved. [R307-401-1]



APPENDIX C

DAQE-AN130720006-12

Page 3

- I.4 All records referenced in this AO or in other applicable rules, which are required to be kept by the owner/operator, shall be made available to the Director or Director's representative upon request, and the records shall include the two-year period prior to the date of the request. Unless otherwise specified in this AO or in other applicable state and federal rules, records shall be kept for a minimum of two (2) years. [R307-401-8]
- I.5 At all times, including periods of startup, shutdown, and malfunction, owners and operators shall, to the extent practicable, maintain and operate any equipment approved under this AO, including associated air pollution control equipment, in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Director which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source. All maintenance performed on equipment authorized by this AO shall be recorded. [R307-401-4]
- I.6 The owner/operator shall comply with R307-150 Series. Inventories, Testing and Monitoring. [R307-150]
- I.7 The owner/operator shall comply with UAC R307-107. General Requirements: Breakdowns. [R307-107]

Section II: SPECIAL PROVISIONS

- II.A The approved installations shall consist of the following equipment:
- II.A.1 **Chicken Creek Gypsum Processing Plant**
- II.A.2 **One (1) Primary Crusher**
Capacity: 450 tons/hour
Manufacture Date: 1988
- II.A.3 **One (1) Self-Powered Crusher**
Capacity: 450 tons/hour
Manufacture Date: 2006
- II.A.4 **Two (2) Screens**
Capacity: 600 tons/hour each
Manufacture Date: 1988 & Prior to 2008
- II.A.5 **One (1) Self-Powered Screen**
Capacity: 500 tons/hour
Manufacture Date: 2007
- II.A.6 **Miscellaneous Aggregate Processing Equipment**
Includes: grizzlies, feeders, splitters, traps, load bins, conveyors, screws, cyclones, clarifiers, and stackers
Manufactured Prior to 2008



APPENDIX C

DAQE-AN130720006-12

Page 4

- II.A.7 **One (1) 725 kW Diesel Generator**
Rated Capacity: 972.23 hp
Manufacture Date: 1999
- II.A.8 **One (1) Self-Powered Crusher Engine**
Rated Capacity: 245 hp
Manufacture Date: 2006
- II.A.9 **One (1) Self-Powered Screen Engine**
Rated Capacity: 130 hp
Manufacture Date: 2007
- II.A.10 **One (1) 12,000-gallon Storage Tank (new)**
Contents: Diesel Fuel
- II.A.11 **Various Small Storage Tanks**
Contents: Fuel Oil and Diesel Fuel
Listed for informational purposes only.
- II.A.12 **Various Off highway Vehicles**
Includes: Front-end loaders, bulldozers, scrapers, draglines, track-hoes, haul trucks, water trucks, sweeper truck, forklift trucks, boom trucks, etc.
Listed for informational purposes only.
- II.A.13 **Miscellaneous Equipment**
Includes: welders, pumps, motors, pressure washers, parts washers, drilling equipment, blasting equipment, and other equipment associated with construction materials processing, manufacture, and maintenance.
Listed for informational purposes only.
- II.B **Requirements and Limitations**
- II.B.1 **The Chicken Creek Gypsum Processing Plant shall be subject to the following:**
- II.B.1.a Sunroc Corporation shall notify the Director in writing when the 12,000-gallon Storage Tank has been installed and is operational. To ensure proper credit when notifying the Director, send your correspondence to the Director, attn: Compliance Section.
- If the owner/operator has not notified the Director in writing within 18 months from the date of this AO on the status of the construction and/or installation, the Director shall require documentation of the continuous construction and/or installation of the operation. If a continuous program of construction and/or installation is not proceeding, the Director may revoke the AO.
- [R307-401-18]
- II.B.1.b The owner/operator shall conduct its operations either at the East Pit or at the West Pit at the Chicken Creek site. Operations may occur at either pit, but the owner/operator shall not conduct operations at both pits at the same time. [R307-401-8]



APPENDIX C

DAQE-AN130720006-12

Page 5

- II.B.1.c The owner/operator shall not exceed 16 hours of operation per day (from midnight to midnight) at the Chicken Creek Gypsum Processing Plant. [R307-401-8]
- II.B.1.c.1 Hours of operation shall be determined by supervisor monitoring and maintaining of an operations log. Records of daily hours of operation shall include the following:
- A. The date
 - B. The time operations began at the facility
 - C. The time operations ended at the facility
 - D. The total daily hours of operation at the facility
- [R307-401-8]
- II.B.1.d The owner/operator shall not produce more than 150,000 tons of aggregate material per rolling 12-month period and shall not produce more than 4,800 tons of aggregate material per day. [R307-401-8]
- II.B.1.d.1 To determine compliance with a rolling 12-month total, the owner/operator shall calculate a new 12-month total for each day of the previous month by the twentieth day of each month using data from the previous 12 months. Records of production shall be kept for all periods when the plant is in operation. Production shall be determined by belt scale records, scale house records or vendor receipts. The records of production shall be kept on a daily basis. [R307-401-8]
- II.B.1.d.2 The owner/operator shall weigh and account for all aggregate material prior to the aggregate material leaving the site or being used elsewhere on site. [R307-401-8]
- II.B.1.e Unless otherwise specified in this AO, the owner/operator shall not allow visible emissions from any source on site to exceed 20 percent opacity. [R307-201-3]
- II.B.1.e.1 Unless otherwise specified in this AO, opacity observations of emissions from stationary sources shall be conducted according to 40 CFR 60, Appendix A, Method 9. [R307-201-3]
- II.B.2 **All Drilling and Blasting Operations on site shall be subject to the following:**
- II.B.2.a The owner/operator shall install and use a shroud on all aggregate drills when drilling to control fugitive emissions. [R307-401-8]
- II.B.2.b The owner/operator shall not use more than 125 tons of explosives per rolling 12-month period. [R307-401-8]
- II.B.2.b.1 To determine compliance with a rolling 12-month total, the owner/operator shall calculate a new 12-month total for each day of the previous month by the twentieth day of each month using data from the previous 12 months. Amount of explosives used shall be determined by purchasing records or maintaining an operations log. [R307-401-8]



APPENDIX C

DAQE-AN130720006-12

Page 6

- II.B.2.c The owner/operator shall not blast more than 50 blasts per rolling 12-month period. [R307-401-8]
- II.B.2.c.1 To determine compliance with a rolling 12-month total, the owner/operator shall calculate a new 12-month total by the twentieth day of each month using data from the previous 12 months. Number of blasts shall be determined by supervisor monitoring and maintaining of an operations log. [R307-401-8]
- II.B.3 **All Haul Roads and Fugitive Dust Sources shall be subject to the following:**
- II.B.3.a The owner/operator shall not allow visible emissions from haul roads and operational areas on site to exceed 20 percent opacity. [R307-205-4]
- II.B.3.a.1 Visible emission determinations for fugitive dust emissions from haul-road traffic and mobile equipment in operational areas shall use procedures similar to Method 9. The normal requirement for observations to be made at 15-second intervals over a six-minute period, however, shall not apply. Visible emissions shall be measured at the densest point of the plume but at a point not less than 1/2 vehicle length behind the vehicle and not less than 1/2 the height of the vehicle. [R307-205-4]
- II.B.3.b The owner/operator shall cover all haul roads, loader routes, and wheeled-vehicle operational areas with road-base material and shall use water application to maintain opacity limits listed in this AO. The owner/operator may stop applying water to the haul roads, loader routes, and wheeled-vehicle operational areas when the temperature is below freezing but shall still maintain the opacity limits listed in this AO. [R307-401-8]
- II.B.3.b.1 Records of water application shall be kept for all periods when the plant is in operation. The records shall include the following items:
- A. Date and time treatments were made
 - B. Number of treatments made and quantity of water applied
 - C. Rainfall amount received, if any
 - D. Records of temperature, if the temperature is below freezing
- [R307-401-8]
- II.B.3.c The owner/operator shall not allow visible emissions from any fugitive dust source (storage piles, exposed areas, etc.) on site, other than haul roads and operational areas, to exceed 20 percent opacity. [R307-205-4]
- II.B.3.d The owner/operator shall comply with a FDCP acceptable to the Director for control of all dust sources associated with the Chicken Creek Gypsum Processing Plant. The haul road speed of 15 miles per hour shall be posted. [R307-401-8]
- II.B.3.e The owner/operator shall comply with all applicable requirements of R307-205 for Fugitive Emission and Fugitive Dust sources on site. [R307-205]



APPENDIX C

DAQE-AN130720006-12

Page 7

- II.B.4 **All Diesel Engines on site shall be subject to the following:**
- II.B.4.a The 725 kW Generator shall not exceed 2,430,575 horsepower-hours (hp-hrs) of operation per rolling 12-month period. [R307-401-8]
- II.B.4.a.1 To determine compliance with a rolling 12-month total, the owner/operator shall calculate a new 12-month total for each day of the previous month by the twentieth day of each month using data from the previous 12 months. To determine the hp-hrs for the generator, the owner/operator shall multiply the horsepower of the engine and the hours operated for each day. Hours of operation shall be determined by supervisor monitoring and maintaining of an operations log. [R307-401-8]
- II.B.4.b The Self-Powered Crusher Engine and Self-Powered Screen Engine shall not exceed 905,000 hp-hrs of operation combined per rolling 12-month period. [R307-401-8]
- II.B.4.b.1 To determine compliance with a rolling 12-month total, the owner/operator shall calculate a new 12-month total for each day of the previous month by the twentieth day of each month using data from the previous 12 months. To determine the hp-hrs for the generators, the owner/operator shall multiply the horsepower of the engine and the hours operated for that engine for each day and add the total hp-hrs together. Hours of operation shall be determined by supervisor monitoring and maintaining of an operations log. [R307-401-8]
- II.B.4.c The owner/operator shall not allow visible emissions from any diesel engine on site to exceed 20 percent opacity. [R307-201-3]
- II.B.4.d The sulfur content of any diesel fuel burned in any stationary diesel engine on site shall not exceed 15 ppm. [40 CFR 63 Subpart ZZZZ]
- II.B.4.d.1 The sulfur content shall be determined by ASTM Method D2880-71, D4294-89, or approved equivalent. Certification of diesel fuel shall be either by the owner/operator's own testing or by test reports from the diesel fuel marketer. [R307-203-1]
- II.B.5 **All Crushers, Screens, and Conveyors on site shall be subject to the following:**
- II.B.5.a The owner/operator shall not allow visible emissions from any crusher on site to exceed 15 percent opacity. [40 CFR 60 Subpart OOO]
- II.B.5.b The owner/operator shall not allow visible emissions from any screen on site to exceed 10 percent opacity. [40 CFR 60 Subpart OOO]
- II.B.5.c The owner/operator shall not allow visible emissions from any conveyor transfer point on site to exceed 10 percent opacity. [40 CFR 60 Subpart OOO]
- II.B.5.d The owner/operator shall not allow visible emissions from any conveyor drop point on site to exceed 20 percent opacity. [R307-205-4]



APPENDIX C

DAQE-AN130720006-12

Page 8

- II.B.5.e The owner/operator shall install water sprays on all crushers, all screens, and all unenclosed conveyor transfer points on site to control fugitive emissions. Sprays shall operate as required when the temperature is above freezing to maintain the opacity limits listed in this AO. R307-401-8]
- II.B.5.f The owner/operator shall conduct an initial performance test for all crushers, screens, and conveyor transfer points on site within 60 days after achieving the maximum production rate but not later than 180 days after initial startup. Performance tests shall meet the limitations specified in Table 3 to Subpart OOO. Records of initial performance tests shall be kept and maintained on site for the life of the equipment. [40 CFR 60 Subpart OOO]
- II.B.5.f.1 Initial performance tests for fugitive emissions limits shall be conducted according to 40 CFR 60.675(c). The owner or operator may use methods and procedures specified in 40 CFR 60.675(e) as alternatives to the reference methods and procedures specified in 40 CFR 60.675(c). [40 CFR 60 Subpart OOO]
- II.B.5.f.2 The owner/operator shall submit written reports to the Director of the results of all performance tests conducted to demonstrate compliance with the standards set forth in 40 CFR 60.672. [40 CFR 60 Subpart OOO]

Section III: APPLICABLE FEDERAL REQUIREMENTS

In addition to the requirements of this AO, all applicable provisions of the following federal programs have been found to apply to this installation. This AO in no way releases the owner or operator from any liability for compliance with all other applicable federal, state, and local regulations including UAC R307.

NSPS (Part 60), A: General Provisions

NSPS (Part 60), OOO: Standards of Performance for Nonmetallic Mineral Processing Plants

NSPS (Part 60), IIII: Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

MACT (Part 63), A: General Provisions

MACT (Part 63), ZZZZ: National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

Title V (Part 70) area source

PERMIT HISTORY

This AO is based on the following documents:

Supersedes	DAQE-AN0130720005-10 dated November 22, 2010
Is Derived From	Proposed Modification Letter dated August 22, 2011
Is Derived From	NOI dated December 20, 2011
Is Derived From	Additional Information dated January 31, 2012



APPENDIX C

DAQE-AN130720006-12
Page 9

ADMINISTRATIVE CODING

The following information is for UDAQ internal classification use only:

Juab County

CDS B

MACT (Part 63), NSPS (Part 60), Attainment Area, Title V (Part 70) area source



APPENDIX C

ACRONYMS

The following lists commonly used acronyms and associated translations as they apply to this document:

40 CFR	Title 40 of the Code of Federal Regulations
AO	Approval Order
BACT	Best Available Control Technology
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CDS	Classification Data System (used by EPA to classify sources by size/type)
CEM	Continuous emissions monitor
CEMS	Continuous emissions monitoring system
CFR	Code of Federal Regulations
CMS	Continuous monitoring system
CO	Carbon monoxide
CO ₂	Carbon Dioxide
CO ₂ e	Carbon Dioxide Equivalent - 40 CFR Part 98, Subpart A, Table A-1
COM	Continuous opacity monitor
DAQ	Division of Air Quality (typically interchangeable with UDAQ)
DAQE	This is a document tracking code for internal UDAQ use
EPA	Environmental Protection Agency
FDCP	Fugitive dust control plan
GHG	Greenhouse Gas(es) - 40 CFR 52.21 (b)(49)(i)
GWP	Global Warming Potential - 40 CFR Part 86.1818-12(a)
HAP or HAPs	Hazardous air pollutant(s)
ITA	Intent to Approve
LB/HR	Pounds per hour
MACT	Maximum Achievable Control Technology
MMBTU	Million British Thermal Units
NAA	Nonattainment Area
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emission Standards for Hazardous Air Pollutants
NOI	Notice of Intent
NO _x	Oxides of nitrogen
NSPS	New Source Performance Standard
NSR	New Source Review
PM ₁₀	Particulate matter less than 10 microns in size
PM _{2.5}	Particulate matter less than 2.5 microns in size
PSD	Prevention of Significant Deterioration
PTE	Potential to Emit
R307	Rules Series 307
R307-401	Rules Series 307 - Section 401
SO ₂	Sulfur dioxide
Title IV	Title IV of the Clean Air Act
Title V	Title V of the Clean Air Act
TPY	Tons per year
UAC	Utah Administrative Code
UDAQ	Utah Division of Air Quality (typically interchangeable with DAQ)
VOC	Volatile organic compounds



APPENDIX C

SUNROC

CHICKEN CREEK				
Facility	Address:	1.5 miles East of Levan in Chicken Creek Canyon, Levan, Utah, 84639	DAQ ID:	13072
	City, County, ZIP:		AFS ID:	
			SIC ID:	3275
	Parent Company:	Clyde Companies	AO No:	DAQE-AN0130720005-10
	Contact Name:	Brian Harris, Environmental Eng.	AO Date:	November 22, 2010
	Mailing Address:	730 North 1500 West Orem, UT 84057	County:	Juab
	Telephone:	(801) 802-6954		
	UTM East:	Zone 12 - 428,925 m	Latitude:	39.5495 Degrees North
	UTM North:	4,378,075 m	Longitude:	-111.8272 Degrees West
	Regulated As:		NSPS:	

Summary of Criteria Emissions

DESCRIPTION		SCC	UNITS	2011	Emissions in Tons Per Year (TPY)					
					PM10	PM2.5	SOX	NOX	VOC	CO
Ops	Bank Run:	30502033	tpy	0	-	-	-	-	-	-
	Processed Agg:	30502006	tpy	93,417	0.11	0.01	-	-	-	-
Roads	Paved Roads:	2294015000	mi/rd trip	0.40	1.44	0.22	-	-	-	-
	Unpaved Roads:	2296010000	mi/rd trip	2.96	1.14	0.11	-	-	-	-
	Loader Areas:	2296010000	VMT/yr	0.20	0.23	0.02	-	-	-	-
Quarry	Storage Piles	30502007	acres	2.50	0.30	-	-	-	-	-
	Blasting:	30532009	blasts/yr	2	0.02	0.00	0.01	0.07	na	0.26
	Dozing:	2270002069	hr/yr	348	0.13	0.07	-	-	-	-
	Material Handling	30532031	tpy	93,417	0.02	0.00	-	-	-	-
	Wind:	2311020100	acres	5.50	1.05	-	-	-	-	-
Engines	LG. Generators:	2270006005	hp-hr/yr	0	0.00	0.00	0.00	0.00	0.00	0.00
	SM. Generators:	2270006006	hp-hr/yr	129,924	0.14	0.14	0.13	2.01	0.16	0.43
Tks	Diesel Tanks:	2501995090	gallons	31,716	-	-	-	-	0.00	-
TOTAL STATIONARY Emissions:					4.59	0.58	0.14	2.08	0.16	0.70
Mobile	Dozing:	2270002069	hr/yr	348	0.02	-	0.01	0.22	0.02	0.06
	Loaders:	2270002060	hr/yr	427	0.04	-	0.01	0.40	0.05	0.12
	Other Mobile	2270002081	hr/yr	1,581	0.11	-	0.03	1.34	0.12	0.53
TOTAL MOBILE Emissions:					0.17	-	0.04	1.96	0.19	0.72
TOTAL PLANT-WIDE Emissions:					4.75	0.58	0.18	4.04	0.36	1.41

Note:

1. NS-Information "Not Specified" in the permit.
2. All calculations, except tanks, are made with emission factors from AP-42. Estimate Code: 08
3. Tank emissions are estimated using TANKS 4.09D. Estimate code: 08



APPENDIX C

SUNROC

CHICKEN CREEK - AGGREGATE PLANT

Summary of HAPs

	CAS #	HAP Name	Emissions in Tons Per Year (TPY)	
			Emissions (lb/yr)	Emissions (tons/yr)
1	*POM*	Polycyclic Organic Matter (POM)	5.56E-02	2.78E-05



APPENDIX C

CHICKEN CREEK HAZARDOUS AIR POLLUTANTS (HAPs)

HAZARDOUS AIR POLLUTANT		Generators ¹	Total ²		Report HAPs?
EPA NAME	CAS		lb/yr	tpv	
1,1,1-Trichloroethane (methyl chloroform)	71-55-6		0.00E+00	0.00	no
1,3-Butadiene	87-68-3	1.29E-02	1.29E-02	0.00	no
2-Butanone (Methyl ethyl ketone)	78-93-3		0.00E+00	0.00	-
2-Methylnaphthalene	91-57-6		0.00E+00	0.00	-
3-Methylchoranthrene	58-49-5		0.00E+00	0.00	-
7,12-Dimethylbenz(a)anthracene	57-97-6		0.00E+00	0.00	-
Acenaphthene	83-32-9	4.69E-04	4.69E-04	0.00	-
Acenaphthylene	208-96-8	1.67E-03	1.67E-03	0.00	-
Acetaldehyde	75-07-0	2.54E-01	2.54E-01	0.00	no
Acrolein	107-02-8	3.06E-02	3.06E-02	0.00	no
Anthracene	120-12-7	6.18E-04	6.18E-04	0.00	-
Antimony	7440-36-0		0.00E+00	0.00	no
Arsenic	7440-38-2		0.00E+00	0.00	no
Barium	*barium*		0.00E+00	0.00	-
Benzene	71-43-2	3.08E-01	3.08E-01	0.00	no
Benzol(a)anthracene	56-55-3	5.55E-04	5.55E-04	0.00	-
Benzofaloprene	50-32-8	6.22E-05	6.22E-05	0.00	-
Benzobifluoranthene	205-99-2	3.28E-05	3.28E-05	0.00	-
Benzolepyrene	192-97-2		0.00E+00	0.00	-
Benzolq.h.lbarylene	191-24-2	1.62E-04	1.62E-04	0.00	-
Benzokifluoranthene	205-82-3	5.12E-05	5.12E-05	0.00	-
Beryllium	7440-41-7		0.00E+00	0.00	no
Bromomethane (Methyl bromide)	74-83-9		0.00E+00	0.00	no
Cadmium	7440-43-9		0.00E+00	0.00	no
Carbon Disulfide	75-15-0		0.00E+00	0.00	no
Chloroethane (Ethyl chloride)	75-00-3		0.00E+00	0.00	no
Chloromethane (Methyl chloride)	74-87-3		0.00E+00	0.00	no
Chromium	7440-47-3		0.00E+00	0.00	no
Chrysene	218-01-9	1.17E-04	1.17E-04	0.00	-
Cobalt	7440-48-4		0.00E+00	0.00	-
Copper	*copper*		0.00E+00	0.00	-
Cumene	98-82-8		0.00E+00	0.00	no
Dibenzol(a,h)anthracene	53-70-3	1.93E-04	1.93E-04	0.00	-
Dichlorobenzene	25321-22-6		0.00E+00	0.00	-
Ethylbenzene	100-41-4		0.00E+00	0.00	no
Fluoranthene	206-44-0	2.52E-03	2.52E-03	0.00	-
Fluorene	86-73-7	9.65E-03	9.65E-03	0.00	-
Formaldehyde	50-00-0	3.90E-01	3.90E-01	0.00	no



APPENDIX C

CHICKEN CREEK HAZARDOUS AIR POLLUTANTS (HAPs)

HAZARDOUS AIR POLLUTANT		Generators ¹		Total ²		HAPs De Minimis Levels ³	Report HAPs?
EPA NAME	CAS	lb/yr	tpy	lb/yr	tpy	lb/yr	
Hexane	110-54-3		0.00E+00	0.00E+00	0.00	500	no
Hex-Chromium	18540-29-9		0.00E+00	0.00E+00	0.00	0.07	no
Hydrochloric Acid	7647-01-0		0.00E+00	0.00E+00	0.00	117.91	no
Indeno(1,2,3-cd)pyrene	193-39-5	1.24E-04	0.00E+00	1.24E-04	0.00	Not listed	-
Isocotane (2,2,4-Trimethylpentane)	540-84-1		0.00E+00	0.00E+00	0.00	0	no
Lead	7439-92-1		0.00E+00	0.00E+00	0.00	0	no
Manganese	7439-96-5		0.00E+00	0.00E+00	0.00	4.24	no
Mercury	7439-97-6		0.00E+00	0.00E+00	0.00	0.21	no
Methylene Chloride	75-09-2		0.00E+00	0.00E+00	0.00	500	no
MTBE	1634-04-4		0.00E+00	0.00E+00	0.00	500	no
Naphthalene	91-20-3	2.80E-02	0.00E+00	2.80E-02	0.00	500	no
Nickel	7440-02-0		0.00E+00	0.00E+00	0.00	31.83	no
Polycyclic Organic Matter (POM)	*POM*	5.56E-02	0.00E+00	5.56E-02	0.00	0	YES
Perylene	198-55-0		0.00E+00	0.00E+00	0.00	Not listed	-
Phenanthrene	85-01-8	9.72E-03	0.00E+00	9.72E-03	0.00	Not listed	-
Phenol	108-95-2		0.00E+00	0.00E+00	0.00	408.39	no
Phosphorus	7723-14-0		0.00E+00	0.00E+00	0.00	2.15	no
Propionaldehyde	123-38-6		0.00E+00	0.00E+00	0.00	0	no
Pyrene	129-00-0	1.58E-03	0.00E+00	1.58E-03	0.00	Not listed	-
Quinone	106-51-4		0.00E+00	0.00E+00	0.00	9.38	no
Selenium	7782-49-2		0.00E+00	0.00E+00	0.00	4.24	no
Silver	*silver*		0.00E+00	0.00E+00	0.00	Not listed	-
Styrene	100-42-5		0.00E+00	0.00E+00	0.00	500	no
Tetrachloroethene	127-18-4		0.00E+00	0.00E+00	0.00	500	no
Thallium	*thallium*		0.00E+00	0.00E+00	0.00	Not listed	-
Toluene	108-88-3	1.35E-01	0.00E+00	1.35E-01	0.00	500	no
Total PCDD/PCDF	*Dioxin/Furan*		0.00E+00	0.00E+00	0.00	0	no
Trichloroethene	79-01-6		0.00E+00	0.00E+00	0.00	500	no
Trichlorofluoromethane	*trichlorof*		0.00E+00	0.00E+00	0.00	Not listed	-
Xylenes (m-p-)	108-38-3		0.00E+00	0.00E+00	0.00	500	no
Xylenes (o-)	95-47-6		0.00E+00	0.00E+00	0.00	500	no
Xylene	1330-20-7	9.42E-02	0.00E+00	9.42E-02	0.00	500	no
Zinc	*zinc*		0.00E+00	0.00E+00	0.00	Not listed	-
TOTALS		1.28E+00	1.28E+00	1.28E+00	6.40E-04		

Notes

- This form is a summary of calculations from specific processes at the facility. The formulas and explanations for the emissions are presented with form for each source.
- Total (lb/yr) is the sum of HAPs from all sources and Total (tpy) is the Tot Acenaphthene Total (lb/yr) / 2000 (lb / ton) =
- HAPs de Minimis Levels provided by UDAQ as thresholds for reporting specific HAPs. Since a large number of HAPs with HAPs de Minimis Levels exceeded the threshold, TLVs were calculated for all HAPs.



APPENDIX C



APPENDIX C



APPENDIX C



APPENDIX C

CHICKEN CREEK UNCONTROLLED/CONTROLLED EMISSIONS

DESCRIPTION	Production/Activity		NSPS	Criteria Pollutants	Fugitive	Uncontrolled Specifications			Control Specifications		Final Emissions								
	Value	Units				Emission Factor	Units	tpy	Control Device	Control Efficiency	PM10	PM2.5	SO2	NOx	VOC	CO			
PAVED ROADS	Haul Trucks	NA ¹	VMT	No	PM10 PM2.5	Fugitive	NA ¹	lb/VMT lb/VMT	1.44 0.22	-	000 000	0% 0%	1.44	0.22	-	-	-	-	
													SUBTOTAL:	1.44	0.22	0.00	0.00	0.00	0.00
UNPAVED ROADS	Wheeled Loaders	NA ¹	VMT	No	PM10 PM2.5	Fugitive	NA ¹	lb/VMT lb/VMT	1.56 0.16	Water Spray	061	85% 85%	0.23	0.02	-	-	-	-	
	Haul Trucks	NA ¹	VMT	No	PM10 PM2.5	Fugitive	NA ¹	lb/VMT lb/VMT	7.61 0.76	Water Spray	061	85% 85%	1.14	0.11	-	-	-	-	
													SUBTOTAL:	1.38	0.14	0.00	0.00	0.00	0.00
STORAGE PILES	AGG and HMA Process Piles	3	acres	No	PM10	Fugitive	9.48	lb/acre-day	3.02	Water Spray	061	90%	0.30	-	-	-	-	-	
													SUBTOTAL:	0.30	0.00	0.00	0.00	0.00	0.00
MATERIAL HANDLING	Loadout Processes	93,417	ton/yr	No	PM10 PM2.5	Fugitive	0.00022	lb/ton	0.01	-	000	0%	0.01	0.00	-	-	-	-	
	Loading Processes	93,417	ton/yr	No	PM10 PM2.5	Fugitive	0.00022	lb/ton	0.01	-	000	0%	0.01	0.00	-	-	-	-	
							0.00003	lb/ton	0.00				SUBTOTAL:	0.02	0.00	0.00	0.00	0.00	0.00
WIND EROSION	Disturbed Area	6	acres	No	PM10	Fugitive	0.1900	ton/acre/d	1.05	-	000	0%	1.05	-	-	-	-	-	
													SUBTOTAL:	1.05	0.00	0.00	0.00	0.00	0.00
QUARRY	Dozing	348	hrs/yr	No	PM10 PM2.5	Fugitive	0.7528	lb/hr	0.13	-	000	0%	0.13	0.07	-	-	-	-	
							0.4138	lb/hr	0.07				#REF!	#REF!	#REF!	#REF!	0.00	#REF!	#REF!
	Grizzly Screen	93,417	ton/yr	Yes	PM10 PM2.5	Fugitive	0.00870	lb/ton	0.41	Wet Suppression	143	91.49%	0.03	0.00	-	-	-	-	
	Primary Crusher	93,417	ton/yr	Yes	PM10 PM2.5	Fugitive	0.00240	lb/ton	0.11	Wet Suppression	143	77.50%	0.03	0.00	-	-	-	-	
	Conveyors	185,833	ton/yr	Yes	PM10 PM2.5	Fugitive	0.00110	lb/ton	0.10	Wet Suppression	143	95.82%	0.00	0.00	-	-	-	-	
CRUSHED STONE	Scalping Screen	4,671	ton/yr	Yes	PM10 PM2.5	Fugitive	0.00870	lb/ton	0.02	Wet Suppression	143	91.49%	0.00	0.00	-	-	-	-	
	Secondary Crusher	18,683	ton/yr	Yes	PM10 PM2.5	Fugitive	0.00240	lb/ton	0.02	Wet Suppression	143	77.50%	0.01	0.00	-	-	-	-	
	Secondary Crusher	112,100	ton/yr	Yes	PM10 PM2.5	Fugitive	0.00870	lb/ton	0.49	Water Saturation	-	91.49%	0.04	0.00	-	-	-	-	
													SUBTOTAL:	0.11	0.01	0.00	0.00	0.00	0.00
STORAGE TANKS	Diesel Tanks	31,716	gallyr	No	VOC	Fugitive	-	-	0.00	-	0.00	0%	-	-	-	-	0.00	-	-
													SUBTOTAL:	0.00	0.00	0.00	0.00	0.00	0.00



APPENDIX C

CHICKEN CREEK UNCONTROLLED/CONTROLLED EMISSIONS

DESCRIPTION	Production/Activity		NSPS	Criteria Pollutant	Fugitive	Uncontrolled Specifications			Control Specifications			Final Emissions					
	Value	Units				Emission Factor	Units	tpy	Control Device	Control Device Code	Control Eff. %	PM10 tpy	PM2.5 tpy	SO2 tpy	NOx tpy	VOC tpy	CO tpy
GENERATORS	Large Generators	0	hp-hr/yr	PM10	Non-Fugitive	0.0001 lb/hp-hr	0.00	-	000	0%	0.00	0.00	0.00	0.00	0.00	0.00	
				PM2.5	Non-Fugitive	0.0001 lb/hp-hr	0.00	-	000	0%	0.00	0.00	0.00	0.00	0.00	0.00	
				SO ₂	Non-Fugitive	0.0012 lb/hp-hr	0.00	-	000	0%	0.00	0.00	0.00	0.00	0.00	0.00	
				NOx	Non-Fugitive	0.0240 lb/hp-hr	0.00	-	000	0%	0.00	0.00	0.00	0.00	0.00	0.00	
				VOC	Non-Fugitive	0.0006 lb/hp-hr	0.00	-	000	0%	0.00	0.00	0.00	0.00	0.00	0.00	
	Small Generators	129,924	hr/yr	CO	Non-Fugitive	0.0055 lb/hp-hr	0.00	-	000	0%	0.00	0.00	0.00	0.00	0.00	0.00	
				PM10	Non-Fugitive	0.0022 lb/hp-hr	0.14	-	000	0%	0.14	0.14	0.13	2.01	0.16	0.43	
				PM2.5	Non-Fugitive	0.0022 lb/hp-hr	0.14	-	000	0%	0.14	0.14	0.13	2.01	0.16	0.43	
				SO ₂	Non-Fugitive	0.0021 lb/hp-hr	0.13	-	000	0%	0.13	0.13	0.13	2.01	0.16	0.43	
				NOx	Non-Fugitive	0.0310 lb/hp-hr	2.01	-	000	0%	2.01	2.01	0.13	2.01	0.16	0.43	
OFF-HIGHWAY MOBILE	Track-Type Dozers	348	hr/yr	CO	Non-Fugitive	0.0025 lb/hp-hr	0.16	-	000	0%	0.16	0.16	0.13	2.01	0.16	0.43	
				PM10	Non-Fugitive	0.1120 lb/hr	0.02	-	000	0%	0.02	0.02	0.01	0.22	0.02	0.06	
				PM2.5	Non-Fugitive	ND lb/hr	-	-	000	0%	-	-	0.01	0.22	0.02	0.06	
				SO ₂	Non-Fugitive	0.0310 lb/hr	0.01	-	000	0%	0.01	0.01	0.01	0.22	0.02	0.06	
				NOx	Non-Fugitive	1.2600 lb/hr	0.22	-	000	0%	0.22	0.22	0.01	0.22	0.02	0.06	
	Wheeled Loaders	427	hr/yr	VOC	Non-Fugitive	0.1210 lb/hr	0.02	-	000	0%	0.02	0.02	0.01	0.22	0.02	0.06	
				CO	Non-Fugitive	0.3460 lb/hr	0.06	-	000	0%	0.06	0.06	0.01	0.22	0.02	0.06	
				PM10	Non-Fugitive	0.1720 lb/hr	0.04	-	000	0%	0.04	0.04	0.01	0.22	0.02	0.06	
				PM2.5	Non-Fugitive	ND lb/hr	-	-	000	0%	-	-	0.01	0.22	0.02	0.06	
				SO ₂	Non-Fugitive	0.0410 lb/hr	0.01	-	000	0%	0.01	0.01	0.01	0.22	0.02	0.06	
Other Mobile	1,581	hr/yr	NOx	Non-Fugitive	1.8900 lb/hr	0.40	-	000	0%	0.40	0.40	0.01	0.40	0.05	0.12		
			VOC	Non-Fugitive	0.2500 lb/hr	0.05	-	000	0%	0.05	0.05	0.01	0.40	0.05	0.12		
			CO	Non-Fugitive	0.5720 lb/hr	0.12	-	000	0%	0.12	0.12	0.01	0.40	0.05	0.12		
			PM10	Non-Fugitive	0.1390 lb/hr	0.11	-	000	0%	0.11	0.11	0.01	0.40	0.05	0.12		
			PM2.5	Non-Fugitive	ND lb/hr	-	-	000	0%	-	-	0.03	1.34	0.12	0.53		
SUBTOTAL:						0.17	0.00	0.04	1.96	0.19	0.72						
GRAND TOTAL EMISSIONS:						#REF!	#REF!	#REF!	#REF!	#REF!	0.36	#REF!					

- Notes:
- These figures are not included on the summary because they are specific for each road. Only uncontrolled and controlled emissions are totaled from the road calculations.
 - This is a summary of total emissions. The equations and explanation of the emissions calculation are presented on the form of the specific source.



APPENDIX C

CHICKEN CREEK
Stack Information

STACK INFORMATION

Source	Stack Test	Stack Height ft	Stack Diameter ft	Exit Temp. F	Exit Velocity m/s
Aggregate Plant Generators	NO	-	-	-	-
	NO	-	-	-	-



CHICKEN CREEK Operation Schedule

Description of Emission Source	Hours/Day	Days/Week	Weeks/Year	Hours/Year	Days/Year	Process Start Time	Process Finish Time
Aggregate Plant	10	5	50	2380	250	700	1730
Drilling/Blasting	8	1	2	16	2	600	1700
Generators							
Gen 1	11	5	44	447	220	630	1730
Gen 2	11	5	51	1610	255	2100	600
Storage Piles	11	5	51	2680	255	630	1700
Dozers	10	5	50	348	250	700	1730
Loaders	11	5	50	427	250	630	1730
Other Mobile	5	5	50	1581	250	700	1700

Description of Emission Source	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Aggregate Plant	165	165	195	195	195	217	217	217	217	217	217	165
Drilling/Blasting	0	0	0	0	0	5	5	5	0	0	0	0
Generators	0	0	0	0	0	0	0	0	0	0	0	0
Gen 1	167	167	183	183	183	220	220	220	183	183	183	167
Gen 2	200	200	228	228	228	238	238	238	238	238	238	200
Storage Piles	200	200	217	217	217	238	238	238	238	238	238	200
Dozers	165	165	195	195	195	217	217	217	217	217	217	165
Loaders	165	165	217	217	217	238	238	238	217	217	217	165
Other Mobile	73	73	87	87	87	108	108	108	108	108	108	73

APPENDIX C



APPENDIX C

CHICKEN CREEK PROCESSED AGGREGATE

Aggregate Production	Annual (TPY)
	93,417

Description ¹	Fraction Thruput ²	Thruput ³ ton/yr	Uncontrolled PM10 EF ⁴ lb/ton	Moisture %	Dust Control code	Ce %	Controlled PM10 EF ⁴ lb/ton	PM10 Emissions ⁵ lb/yr	tpy
Grizzly Screen	100%	93,417	0.00870	3.0%	061	91.49	0.00074	69	0.03
Conveyor Transfers	200%	186,833	0.00110	3.0%	061	95.82	0.000046	9	0.00
Primary Crusher	100%	93,417	0.00240	3.0%	061	77.50	0.00054	50	0.03
Scalping Screen	5%	4,671	0.00870	3.0%	061	91.49	0.00074	3	0.00
Secondary Crusher	20%	18,683	0.00240	3.0%	061	77.50	0.00054	10	0.01
Secondary Screen	120%	112,100	0.00870	3.0%	061	91.49	0.00074	83	0.04

TOTAL: 0.11

Description ¹	Fraction Thruput ²	Thruput ³ ton/yr	Uncontrolled PM 2.5 EF ⁶ lb/ton	Moisture %	Dust Control code	Ce %	Controlled PM 2.5 EF ⁶ lb/ton	PM 2.5 Emissions ⁷ lb/yr	tpy
Grizzly Screen	100%	93,417	ND	3.0%	061	-	0.00005	5	0.00
Conveyor Transfers	200%	186,833	ND	3.0%	061	-	0.000013	2	0.00
Primary Crusher	100%	93,417	ND	3.0%	061	-	0.00010	9	0.00
Scalping Screen	5%	4,671	ND	3.0%	061	-	0.00005	0	0.00
Secondary Crusher	20%	18,683	ND	3.0%	061	-	0.00010	2	0.00
Secondary Screen	120%	112,100	ND	3.0%	061	-	0.00005	6	0.00

TOTAL: 0.01



CHICKEN CREEK
PROCESSED AGGREGATE

Notes:

1. All operations are 'controlled' with a wet suppression system (spray nozzles)
2. Process fraction is estimated by source, overall throughput is established at the grizzly.
3. Example Calculation: $\text{Secondary Crusher Thru-put (tpy)} = 93416.73 \times 0.2 = 18683.346 \text{ TPY}$
4. AP-42 Table 11.19.2-2 Emission Factors for Crushed Stone Processing Operations
5. Control efficiency calculated from data presented in AP-42 Table 11.19.2-2.
Example Calculation: $\text{Control Efficiency for Secondary Crusher} = 100 \times (1 - 0.00054 / 0.0024) = 77.5 \%$
6. Uncontrolled PM_{2.5} Emission Factors are not provided by AP-42.
7. Control efficiency could not be calculated because no data exists for Uncontrolled PM 2.5 emission factors.
8. Example Calculation for Emissions:
 $\text{PM}_{10} \text{ Emissions for Grizzly Screen (tpy)} = \text{Controlled EF (lb/ton)} \times \text{Thru-put (tpy)} / 2000 \text{ (lbs/ton)} = 0.00074 \times 93416.73 / 2000 \text{ (lbs/ton)} = 0.03 \text{ tpy}$



APPENDIX C

CHICKEN CREEK
PAVED ROADS

Breakdown of Production	tons/yr
Aggregate	93,417

Average Paved Road Length		1,056.00 feet																	
Vehicle Type	Direction of Traffic	Empty Vehicle Weight *	Load Weight **	Loaded Vehicle Weight *	Average Weight *	Load In-Loadout *	Weighted average weight **	Trips per year *		Distance per trip *		VMT per year **							
								tons	tons/yr	feet	miles								
Aggregate Haul Truck	1	13.2	24.7	37.9	25.55	93,417	25.55	3782.1	1056	0.20	756.4								
Weighted average used for calculating emission factor (lb), W								25.55	Total vehicle miles traveled (VMT) on this road section (lb)		756.41								

$$E = \left[k \left(\frac{sL}{2} \right)^{0.65} \times \left(\frac{W}{3} \right)^{1.5} - C \right] \times \left(1 - \left(\frac{P}{4N} \right) \right)$$

Source of Equation: See Table Notes (g)

TOTAL EMISSIONS

PM ₁₀ Emissions (tons/yr)	Vehicle miles travelled (VMT/yr) (lb)	PM ₁₀ Emissions from this section of road (ton) (lb)
3.80	756.41	1.44

PM _{2.5} Emissions (tons/yr)	Vehicle miles travelled (VMT/yr) (lb)	PM _{2.5} Emissions from this section of road (ton) (lb)
0.57	756.41	0.22

Equation Parameter	Value
E, Emission factor (paved roads), (lb/VMT) (g)	see below table
k, Particle size multiplier for particle size range (PM ₁₀), (lb/VMT) (Source: AP-42 Table 13.2-1-1)	0.016
k, Particle size multiplier for particle size range (PM _{2.5}), (lb/VMT) (Source: AP-42 Table 13.2-1-1)	0.0024
sL, Road surface silt loading, (g/m ²) (Source: Site specific test data (see Appendix G))	70.0
W, Average weight (tons) of the vehicles traveling the road	25.55
C, emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear for PM ₁₀ (Source: AP-42 Table 13.2-1-2)	0.00047
C, emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear for PM _{2.5} (Source: AP-42 Table 13.2-1-2)	0.00038
P, number of "wet" days with at least 0.254 mm (0.01 in) of precipitation during the averaging period (Source: Western Regional Climate Center, Santaquin Chlorinator, Utah, 1948 to 2007)	77
N, number of days in the averaging period	365



APPENDIX C

CHICKEN CREEK PAVED ROADS

Notes:

1. Weighted average of the manufacturer advertised weights of the individual trucks used
- 2a. Weighted average of typical load carried by the individual trucks used
- 2b. Loaded Vehicle Weight = Empty Vehicle Weight + Load Weight
3. For 2-way traffic, Average Weight of vehicle = (Empty vehicle weight + Loaded vehicle weight) / 2
4. Load in-Loadout = material tonnage/year
- 5a. Weighted average weight of a vehicle = (average weight of the vehicle) x (load in-loadout on the vehicle, in tons) / (total load in-loadout by all vehicles on this section of road)
- 5b. Sum total of weighted averages of individual vehicle types
6. Trips per period = (Load in-Loadout tonnage) / Load weight
7. Distance per trip obtained from known operational conditions at facility
- 8a. Vehicle Miles Traveled (VMT) per year = (trips per year) x (distance per trip)
- 8b. Sum total of VMT on this section of road, VMT/yr
9. Emission Factor Source: AP-42 5th Ed., Section 13.2.1, Equation 2, Paved Roads, Rev.: November 2006
AP-42 does not allow use of control efficiency for emission calculations from paved roads
10. Emissions (tons/yr) = Emission factor (lb/VMT) x (VMT/year) x (1/2000 ton/lbs)



APPENDIX C

CHICKEN CREEK UNPAVED ROADS

Breakdown of Production	tons/yr
Aggregate	93,417

Average Unimproved Road Length	7814.4	feet
Vehicle Type	Direction of Traffic	Empty Vehicle Weight
	1 = one-way 2 = two-way	tons
Aggregate Haul Truck	2	13.2

TOTAL EMISSIONS

PM ₁₀ Emissions (tons/yr)	PM _{2.5} Emissions (tons/yr)
1.36	1.14
Vehicle miles travelled (VMT)	Vehicle miles travelled (VMT)
11194.88	11194.88

PM ₁₀ Emissions (tons/yr)	PM _{2.5} Emissions (tons/yr)
0.136	0.114
Vehicle miles travelled (VMT)	Vehicle miles travelled (VMT)
11194.88	11194.88

$$E = K \left(\frac{S}{12} \right)^{0.75} \left(\frac{W}{3} \right)^{0.75} \times (365 - P/365)$$

Equation Parameter	Value
K, vehicle size multiplier for particle size range (PM ₁₀)	448 (see table)
S, particle size multiplier for particle size range (PM ₁₀)	1.5
W, vehicle size multiplier for particle size range (PM _{2.5})	6.18
P, surface material silt content, (%) (source: AR-42 Chapter 13.2.2)	4.8
W, mean weight (tons) of the vehicles traveling the road	25.55
a, constant for PM ₁₀ and PM _{2.5} on industrial roads (source: AR-42 Chapter 13.2.2)	9.9
b, constant for PM ₁₀ and PM _{2.5} on industrial roads (source: AR-42 Chapter 13.2.2)	0.45
P, number of "wet" days with at least 0.014 inches (0.01 in) of precipitation during the averaging period (source: Western Regional Climate Center, Santaquin Chlorinator, Utah, 1948 to 2007)	77



APPENDIX C

CHICKEN CREEK UNPAVED ROADS

Notes:

1. Weighted average of the manufacturer advertised weights of the individual trucks used
- 2a. Weighted average of typical load carried by the individual trucks used
- 2b. Loaded Vehicle Weight = Empty Vehicle Weight + Load Weight
3. For 2-way traffic, Average Weight of vehicle = (Empty vehicle weight + Loaded vehicle weight) / 2
4. For 1-way traffic, Average Weight of vehicle = (Empty vehicle weight + Loaded vehicle weight) / 2
- 5a. Weighted average weight of a vehicle = (average weight of the vehicle) x (load in-loadout on the vehicle, in tons) / (total load in-loadout by all vehicles on this section of road)
- 5b. Sum total of weighted averages of individual vehicle types
6. Trips per period = (Load in-Loadout tonnage) / Load weight
7. Distance per trip is an average of the most commonly used unpaved roads obtained from known operational conditions at facility.
- 8a. Vehicle Miles Traveled (VMT) per year = (trips per year) x (distance per trip)
- 8b. Sum total of VMT on this section of road, VMT/yr
9. Emission Factor Source: Emission Factor Source: AP-42 5th Ed. Section 13.2.2, Equations 1a and 2, Unpaved Roads, Rev. November 2006
10. Emissions (lb/yr) = Emission factor (lb/VMT) x (VMT/yr) x (1/2000 tons/lbs)
11. Control Efficiency = 80% Calculated as follows: Controlled Emissions (lb/yr) = (1 - Control Eff.) x Uncontrolled Emissions (lb/yr) Source: AP-42 Figure 13.2.2-2 with M-2



CHICKEN CREEK
UNPAVED LOADER ROADS

Vehicle Type	Empty Vehicle Weight *		Loaded Vehicle Weight *		Average Weight *		Loader Hours *		Avg. Speed *		VMT per year *	
	tons	lb	tons	lb	tons	lb	hr/yr	min/yr	mi/hr	mi/yr	mi/yr	mi/yr
Loaders	28.2	3.6	31.8	30.0	427	5	2135.0					

TOTAL EMISSIONS

PM ₁₀ Emissions (tons/yr)	Vehicle miles travelled (VMT/yr) *	Uncontrolled PM ₁₀ Emissions from this section of road (tpy) *	Controlled PM ₁₀ Emissions from this section of road (tpy) *
1.46	2135.00	1.56	0.23

PM _{2.5} Emissions (tons/yr)	Vehicle miles travelled (VMT/yr) *	Uncontrolled PM _{2.5} Emissions from this section of road (tpy) *	Controlled PM _{2.5} Emissions from this section of road (tpy) *
0.146	2135.00	0.16	0.02

- Notes:
1. Manufacturer advertised weight for vehicle class (manufacturer info - Caterpillar Model 968H Loader)
 - 2a. Typical load carried by the vehicle (manufacturer info - Caterpillar Model 972 Loader)
 - 2b. Loaded Vehicle Weight = Empty Vehicle Weight + Load Weight
 3. For 2-way traffic, Average Weight of vehicle = (Empty vehicle weight + Loaded vehicle weight) / 2
 4. Loader hours are provided by the client for 2011.
 5. The average loader speed is estimated, based on loaded and unloaded speeds.
 6. Vehicle Miles Travelled (VMT) per year = (VMT/yr) * (12/2000 tons/yr)
 7. Emissions Factor = (Emissions (tons/yr) / (VMT/yr)) * (12/2000 tons/yr)
 8. Emissions Factor Source: AP-42 8th Ed. Section 13.2.2, Emissions 1a and 2, Unpaved Roads, rev Nov 2006
 9. Control Efficiency = 85%

Calculated as follows: Controlled Emissions (tons/yr) = Uncontrolled Emissions (tons/yr) * (1 - Control Eff.) Source: AP-42 Figure 13.2.2.2 with 1b-2.

$$E = k \left(\frac{s}{12} \right)^a \times \left(\frac{W}{3} \right)^b \times (365 - P/365)$$

Source of Equation: See Table Notes (8)

Equation Parameter	Value
E, annual size-specific emission factor for PM ₁₀ (unpaved industrial roads) extrapolated for natural mitigation (9)	see below table
k, Particle size multiplier for particle size range (PM ₁₀) (Source: AP-42 Table 13.2.2-2)	1.5
k, Particle size multiplier for particle size range (PM _{2.5}) (Source: AP-42 Table 13.2.2-2)	0.15
s, surface material silt content, (%) (Source: AP-42 Chapter 13.2.2)	4.8
W, mean weight (tons) of the vehicles traveling the road	28.99
a, constant for PM ₁₀ and PM _{2.5} on industrial roads (Source: AP-42 Table 13.2.2-2)	0.9
b, constant for PM ₁₀ and PM _{2.5} on industrial roads (Source: AP-42 Table 13.2.2-2)	0.46
P, number of "wet" days with at least 0.254 mm (0.01 in) of precipitation during the averaging period (Source: Western Regional Climate Center, Santaquin Chlorinator, Utah, 1948 to 2007)	77



Notes:

- The scaling factor for PM10 for bulldozing overburden (0.75 \times PM15) was used as a basis. Since the scaling factor for bulldozing overburden is to be applied to the corresponding PM15 emission factor and since there is no data provided for PM15 for active storage pile emissions, a PM15 value was estimated for active storage piles using the ratio of PM15 to TSP provided for bulldozing overburden as follows:

Applying the PM15 to TSP ratio and PM10 scaling factor based on bulldozing overburden, a scaling factor for the active storage pile PM10 is estimated as:

3. Storage piles use water stabilization and since the piles are very active, the material remains wet. Therefore, a $0.25 \times 0.75 = 0.19$

Based on control efficiency of = 90%

Controlled PM₁₀ Emissions (lb/hr) = 2.5 (acres) x 9.48 (lb/acres/day) / 11 (hrs/day) x (1-0.9) = 2.15 lb/hr

Controlled PM10 Emissions (lb/hr) = 2.5 (acres) x 9.48 (lb/acres/day) * 255 (days/yr) x (1-0.9) / 2000 (lbs/ton) = 3.02 TPY



CHICKEN CREEK Material Handling

Breakdown of Aggregate Production

Aggregate Process	Production Rate ton/yr	Loadout ¹ ton/yr	Loading ² ton/yr
Processed Aggregate	93,417	93,417	93,417
Bank	0	0	0
TOTAL	93,417	93,417	93,417

Loadout/Loading Operations

Aggregate Plant	Production Rate tons/yr	PM ₁₀ EF ¹ lb/ton	PM _{2.5} EF ¹ lb/ton	PM ₁₀ Emissions tons/yr	PM _{2.5} Emissions tons/yr
Loadout	93,417	0.000221	0.000033	0.010	1.54E-03
Loading	93,417	0.000221	0.000033	0.010	1.54E-03
TOTAL:				0.02	0.00

Notes

1. Loadout refers to transfers from bank or stockpile to haul trucks.
2. Loading refers to transfers from haul trucks/loaders to stockpiles or loading aggregate grizzly.
3. Emission Factor Source: AP-42 5th Ed. Section 13.2.4.3 Equation 1 as follows:

$$EF = k \cdot (0.0032)^{1.3} \cdot (M/2)^{1.4} \quad (\text{lb/ton}), \text{ where}$$

$$M (\text{Moisture}) = \quad \%$$

$$U (\text{Wind speed}) = \quad \text{mph}$$

$$k (\text{for PM}_{10}) = \quad 0.35$$

$$k (\text{for PM}_{2.5}) = \quad 0.053$$

(Source: AP-42 Table 11.9.3 for Western coal overburden)

Source: Western Regional Climate Center, Average of Annual Average for Provo Municipal Airport, Utah, 1996 to 2006

(AP-42 5th Ed. Section 13.2.4.3)

(AP-42 5th Ed. Section 13.2.4.3)

$$\text{PM}_{10} \text{ Emission Factor Calculations for Processed Aggregate} = 0.35x (0.0032) \times (6.3/5)^{1.3} / (7.9/2)^{1.4} = \quad 0.000221 \quad \text{lb/ton}$$

$$\text{PM}_{2.5} \text{ Emission Factor Calculations for Processed Aggregate} = 0.053x (0.0032) \times (6.3/5)^{1.3} / (7.9/2)^{1.4} = \quad 0.000033 \quad \text{lb/ton}$$

$$\text{4. Example Calculation for Loadout PM}_{10}: \quad \text{Loadout PM}_{10} (\text{tons/yr}) = 93417 (\text{tons/yr}) \times 0.000221 (\text{lb/ton}) \times 1/2000 (\text{ton/lbs}) = 0.01 (\text{tons/yr})$$



APPENDIX C

CHICKEN CREEK WIND EROSION

Group ID	Source	PM10 EF ¹ T/acre/yr	Control Method	Control Efficiency	Exposed Area ² acres	PM10 Emissions	
						lb/hr	TPY
WE1	Exposed Area 1	0.19	None	0%	5.50	0.24	1.05

Notes:

1. Emission factor obtained from AP-42, Table 11.9-4, for TSP. It is assumed that PM10 is 50% of TSP, so $0.38 \text{ T/acre/yr} \times 50\% = 0.19 \text{ T/acre/yr}$.
2. Assumes 25% of the disturbed area is active and exposed to wind erosion.



APPENDIX C

HICKEN CREEK TAILPIPE EMISSIONS FROM DIESEL, OFF-ROAD VEHICLES

Description	Operating hr/yr	Pollutant	EF ¹		Emissions	
			lb/hr	g/hp-hr	lb/yr	tpy
Track-Type Dozers 114 HP 64% LF 25,467 hp-hr/yr 211 mmbtu/yr 1.5 kgal/yr # of Vehicles 1	348	PM10	0.112	0.692	39	0.02
		PM2.5	ND	ND	-	-
		SOX	0.031	1.930	11	0.01
		NOX	1.260	7.810	438	0.22
		VOC	0.121	0.750	42	0.02
		CO	0.346	2.150	120	0.06

Wheeled Loaders 143 HP 68% LF 41,552 hp-hr/yr 344 mmbtu/yr 2.5 kgal/yr # of Vehicles 2	427	PM10	0.172	0.805	73	0.04
		PM2.5	ND	ND	-	-
		SOX	0.041	1.950	18	0.01
		NOX	1.890	8.810	807	0.40
		VOC	0.250	0.970	107	0.05
		CO	0.572	2.710	244	0.12

Other Mobile 116 HP 60% LF 110,144 hp-hr/yr 995 mmbtu/yr 7.3 kgal/yr # of Vehicles 6	1,581	PM10	0.139	0.902	220	0.11
		PM2.5	ND	ND	-	-
		SOX	0.033	2.120	52	0.03
		NOX	1.691	11.010	2,673	1.34
		VOC	0.152	1.010	240	0.12
		CO	0.675	4.600	1,067	0.53

TOTAL EMISSIONS	
Pollutant	lb/yr
PM10	332
PM2.5	-
SOX	80
NOX	3,919
VOC	389
CO	1,432

Notes
1. UDAQ recommended Emission Factors for Off-Highway Diesel-Powered Construction Equipment from AP-42 V-II. A copy of these emission factors are provided.

2. Emissions Calculation Example:

$$\text{PM10 Emissions (lb/yr)} = \text{PM10 Emissions Factor (lb/hr)} \times \text{Operating Time (hr / yr)} = 0.112 \times 348 = 38.976$$

$$\text{PM10 Emissions (tpy)} = \text{PM10 Emissions (lb/yr)} / 2000 \text{ (lbs / ton)} = 38.976 / 2000 = 0.019488 \text{ tpy}$$

lb/yr



**CHICKEN CREEK
BULLDOZING OPERATIONS**

Source	hr/yr ¹	s ³ %	M ⁴⁾ %	PM10 Scale Factor	PM2.5 Scale Factor	PM2.5 EF ² lb/hr	PM10 EF ² lb/hr	PM10 Emissions lb/hr	PM10 Emissions TPY ²	PM2.5 Emissions lb/hr	PM2.5 Emissions TPY ²
Bulldozer - excavation	348	6.9	7.9	0.75	0.105	0.414	0.753	0.75	0.13	0.41	0.07
							Total Dozer	0.75	0.13	0.41	0.07

Notes:

1. Bulldozer hrs/yr recorded.
2. Emission Factor Source: AP-42 5th Ed. Section 11.9 (Western Surface Mining), Final Section, October 1998, Tables 11.9-1 and 11.9-3.

$PM_{10} (lb/hr) = (1.0 \cdot s^{1.5} / (M)^{1.4}) \cdot SF$
 where s = silt content of material = 6.9; M = moisture content = 7.9; SF = scaling factor = 0.75
 $PM_{10} EF (lb/hr) = [1.0 \cdot (6.9^{1.5}) / (7.9^{1.4})] \cdot 0.75 = 0.753 lb/hr$

$PM_{2.5} (lb/hr) = (5.7 \cdot s^{1.2} / (M)^{1.3}) \cdot SF$
 where s = silt content of material = 6.9; M = moisture content = 7.9; SF = scaling factor = 0.105
 $PM_{2.5} EF (lb/hr) = [5.7 \cdot (6.9^{1.2}) / (7.9^{1.3})] \cdot 0.105 = 0.414 lb/hr$

Example Calculation: Dozer $PM_{10} = (348 \text{ hrs/yr}) \cdot (0.753 \text{ lb/hr}) / (2000 \text{ lb/tn}) = 0.13 \text{ TPY}$

3. Silt content is geometric mean for overburden reported in Table 11.9-3 of AP-42.

4. Moisture content is geometric mean for overburden reported in Table 11.9-3 of AP-42.



**CHICKEN CREEK
DRILLING & BLASTING**

Activity Totals

Blast Frequency (blasts/yr)	Average Number of Holes/ Blast (holes/ blast)	Total Holes (holes/ year)	Average Area/Blast (ft ² /blast)	Total Area Blasted (acres)	ANFO Density (lb/ft ³) (tons/ blast)
2	42	83	9,615	0.44	52.4 3.95

Calculating Emission Factors

Source ID	Activity	Avg. Area/ Blast (ft ²)	PM10 EF Drilling ¹ (lb/hole)	Drilling Control Efficiency ² (%)	PM10 EF Blasting ³ (lb/blast)	PM2.5 EF Blasting ³ (lb/blast)	Uncontrolled Drilling PM10 Emissions ⁵ (lb/hr)
BL1	Blasting	9,615			6.86	0.40	
DR1	Drilling		0.65	60%			0.02

Dust Emissions

Source ID		UNCONTROLLED		CONTROLLED	
		PM10 Emissions ⁶ (lb/hr)	PM2.5 Emissions ⁶ (lb/hr)	PM10 Emissions ⁶ (lb/hr)	PM2.5 Emissions ⁶ (lb/hr)
BL1	Blasting ⁴	6.86	0.01		
DR1	Drilling ⁵	0.02	0.03	0.01	0.01
TOTALS		6.88	0.03	0.01	0.01

TOTAL DUST EMISSIONS	PM10 (TPY)	0.02	PM2.5 (TPY)	0.00
----------------------	------------	------	-------------	------

Blasting Gases - ANFO

Source ID	Emission Factors ⁷ lb/ton	CO	NOX	SOx	Source Type
BL1	Total Emissions TPY	67.0	17.0	2.0	Area

SAMPLE--Prepared by Kleinfelder



**CHICKEN CREEK
DRILLING & BLASTING**

Activity Totals

Blast Frequency (blasts/yr)	Average Number of Holes/ Blast (holes/ blast)	Total Holes (holes/ year)	Average Area/Blast (ft ² /blast)	Total Area Blasted (acres)	Density (lb/ft ³)	ANFO (tons/ blast)
2	42	83	9,615	0.44	52.4	3.95

Calculating Emission Factors

Source ID	Activity	Avg. Area/ Blast (ft ²)	PM10 EF Drilling ¹ (lb/hole)	Drilling Control Efficiency ² (%)	PM10 EF Blasting ³ (lb/blast)	PM2.5 EF Blasting ³ (lb/blast)	Uncontrolled Drilling PM10 Emissions ⁵ (lb/hr)
BL1	Blasting	9,615			6.86	0.40	
DR1	Drilling		0.65	60%			0.02

Dust Emissions

Source ID		UNCONTROLLED		CONTROLLED	
		PM10 Emissions ⁶ (lb/hr)	PM2.5 Emissions ⁶ (lb/hr)	PM10 Emissions ⁶ (lb/hr)	PM2.5 Emissions ⁶ (lb/hr)
BL1	Blasting ⁴	6.86	0.01		
DR1	Drilling ⁵	0.02	0.03	0.01	0.01
TOTALS		6.88	0.03	0.01	0.01

TOTAL DUST EMISSIONS	PM10 (TPY)	0.02	PM2.5 (TPY)	0.00
-----------------------------	-------------------	-------------	--------------------	-------------

Blasting Gases - ANFO

Source ID	Emission Factors ⁷ lb/ton	CO	NOx	SOx	Source Type
BL1	Total Emissions TPY	67.0	17.0	2.0	Area

SAMPLE--Prepared by Kleinfelder



**CHICKEN CREEK
GENERATORS**

On-Site Power Plant (Diesel)

Large Generators	Small Generators
Total Hp-Hrs	Total Hp-Hrs
0	129,924

ANNUAL CRITERIA POLLUTANT EMISSIONS ¹

Criteria Pollutants	Large Generators		Small Generators	
	EF	Emissions tpy	EF	Emissions tpy
VOC ^{2a, 2b}	6.42E-04	0.000	2.51E-03	0.163
NOx	0.024	0.000	0.031	2.014
CO	5.50E-03	0.000	6.68E-03	0.434
PM10 ^{3a, 4}	1.46E-04	0.000	2.20E-03	0.143
PM2.5 ^{3b, 4}	1.22E-04	0.000	2.20E-03	0.143
SO2 ⁵	1.21E-03	0.000	2.05E-03	0.133



APPENDIX C

CHICKEN CREEK GENERATORS HOURLY AND ANNUAL HAP EMISSIONS

Hazardous Air Pollutant	CAS Number	Large Generators			Small Generators			Total Annual Emissions
		AP-42 Emission Factor ⁶		Annual Emissions ⁷	AP-42 Emission Factor ⁶		Annual Emissions ⁷	
		lb/ MMBtu	lb/ hp-hr ⁴		lb/ MMBtu	lb/ hp-hr ⁴		
1,3-Butadiene	87-68-3				3.91E-05	9.95E-08	1.29E-02	1.29E-02
Acenaphthene	83-32-9	4.68E-06	1.19E-08	0.00E+00	1.42E-06	3.61E-09	4.69E-04	4.69E-04
Acenaphthylene	208-96-8	9.23E-06	2.35E-08	0.00E+00	5.06E-06	1.29E-08	1.67E-03	1.67E-03
Acetaldehyde	75-07-0	2.52E-05	6.41E-08	0.00E+00	7.67E-04	1.95E-06	2.54E-01	2.54E-01
Acrolein	107-02-8	7.88E-06	2.01E-08	0.00E+00	9.25E-05	2.35E-07	3.06E-02	3.06E-02
Anthracene	120-12-7	1.23E-06	3.13E-09	0.00E+00	1.87E-06	4.76E-09	6.18E-04	6.18E-04
Benzene	71-43-2	7.76E-04	1.97E-06	0.00E+00	9.33E-04	2.37E-06	3.08E-01	3.08E-01
Benzo(a)anthracene	56-55-3	6.22E-07	1.58E-09	0.00E+00	1.68E-06	4.27E-09	5.55E-04	5.55E-04
Benzo(a)pyrene	50-32-8	2.57E-07	6.54E-10	0.00E+00	1.88E-07	4.78E-10	6.22E-05	6.22E-05
Benzo(b)fluoranthene	205-99-2	1.11E-06	2.82E-09	0.00E+00	9.91E-08	2.52E-10	3.28E-05	3.28E-05
Benzo(g,h,i)perylene	191-24-2	5.56E-07	1.41E-09	0.00E+00	4.89E-07	1.24E-09	1.62E-04	1.62E-04
Benzo(k)fluoranthene	205-82-3	2.18E-07	5.55E-10	0.00E+00	1.55E-07	3.94E-10	5.12E-05	5.12E-05
Chrysene	218-01-9	1.53E-06	3.89E-09	0.00E+00	3.53E-07	8.98E-10	1.17E-04	1.17E-04
Dibenzo(a,h)anthracene	53-70-3	3.46E-07	8.80E-10	0.00E+00	5.83E-07	1.48E-09	1.93E-04	1.93E-04
Fluoranthene	206-44-0	4.03E-06	1.03E-08	0.00E+00	7.61E-06	1.94E-08	2.52E-03	2.52E-03
Fluorene	86-73-7	1.28E-05	3.26E-08	0.00E+00	2.92E-05	7.43E-08	9.65E-03	9.65E-03
Formaldehyde	50-00-0	7.89E-05	2.01E-07	0.00E+00	1.18E-03	3.00E-06	3.90E-01	3.90E-01
Indeno(1,2,3-cd)pyrene	193-39-5	4.14E-07	1.05E-09	0.00E+00	3.75E-07	9.54E-10	1.24E-04	1.24E-04
Naphthalene	91-20-3	1.30E-04	3.31E-07	0.00E+00	8.48E-05	2.16E-07	2.80E-02	2.80E-02
Polycyclic Org Matter	*POM*	2.12E-04	5.38E-07	0.00E+00	1.68E-04	4.28E-07	5.56E-02	5.56E-02
Phenanthrene	85-01-8	4.08E-05	1.04E-07	0.00E+00	2.94E-05	7.48E-08	9.72E-03	9.72E-03
Pyrene	129-00-0	3.71E-06	9.44E-09	0.00E+00	4.78E-06	1.22E-08	1.58E-03	1.58E-03
Toluene	108-88-3	2.81E-04	7.15E-07	0.00E+00	4.09E-04	1.04E-06	1.35E-01	1.35E-01
Xylene	1330-20-7	1.93E-04	4.91E-07	0.00E+00	2.85E-04	7.25E-07	9.42E-02	9.42E-02
				TOTAL:	0.00E+00		1.28E+00	1.28



CHICKEN CREEK GENERATORS

Notes:

1. Emission Factor Source: AP-42 5th Ed., Chapter 3.4 Tables 3.4-1 and 3.4-2, dated October 1996
- 2a. Based on non-methane portion of TOC emission factor (Table 3.4-1, note f) = 91 %
- 2b. Since particulate emissions from diesel fuel combustion are assumed to be less than 1.0 micrometer in diameter, for small generators $PM_{2.5}$ and Large Gen VOC EF (lb/hp-hr) = .000705 TOC EF (lb/hp-hr) * 91%
- 3a. Based on PM_{10} Emission Factor = $5.73E-02$ lb/MMBtu
Large Gen PM_{10} EF (lb/hp-hr) = PM_{10} EF (lb/MMBtu) / .000393 (hp-hr/Btu) / 1,000,000 (Btu/MMBtu) = $1.46E-04$ (lb/hp-hr)
- 3b. Based on $PM_{2.5}$ Emission Factor = $4.78E-02$ lb/MMBtu
Large Gen $PM_{2.5}$ EF (lb/hp-hr) = $PM_{2.5}$ EF (lb/MMBtu) / .000393 (hp-hr/Btu) / 1,000,000 (Btu/MMBtu) = $1.22E-04$ (lb/hp-hr)
4. Emission Factor (lb/MMBTU) converted to Emission Factor (lb/hp-hr) based on 1 BTU = 0.000393 hp-hrs
5. Emission factor for SOx = $0.00809 \times S$, where S = sulfur content of the fuel (% by weight) = 0.15 %
Large Gen SOx EF (lb/hp-hr) = $.00809 \times .15\%$
6. Emission Factor Source: AP-42 5th Ed., Chapter 3.3 Tables 3.3-2, dated October 1996
7. Annual Emissions = Emission Factor (lb/hr-hr) * Total Hp-Hours From Generator Type (hp-hrs) = Annual Emissions (lbs/year)

Example: Acenaphthene Emissions (lbs/yr) = 0.00000001 (lb/hp-hr) * 0 (hp-hrs/yr) = 0 (lbs/yr)



CHICKEN CREEK STORAGE TANKS

TANK PROPERTIES:

Tank ID	Description	Tank Contents	Tank Contents Details	Tank Color	Orientation	Capacity	Diameter	Length/Height	Annual Thru-put
69-4017	AST	Diesel		White	Horizontal	12,000	8	feet 32	gallons/yr 31,716

EMISSIONS:

Tank ID	Storage Material	Vacuum Setting (psig)	Pressure setting (psig)	Avg. Surface Temp. (F)	Surface Vapor Pressure (psia)	Molecular Weight (lb/lb mole)	Vapor Recovery % Control Efficiency	Standing loss (lbs/yr)	Working loss (lbs/yr)	Annual VOC Emissions (lbs/yr) ¹	Annual VOC Emissions (tons/yr) ²	Hourly CO Emissions (lbs/yr)	Annual CO Emissions (tons/yr)
69-4017	Diesel	-0.03	0.03	64.8625	0.0053	130	NA	1.64	6.05	7.68	0.0038		
Diesel Tank TOTAL:											8	0.00	

Table Notes:

1. Annual VOC and CO Emissions calculated using the EPA TANKS Program, version 4.09D
2. Based on 8760 hours per year, Hourly Emissions (lbs/ hour) = Annual Emissions (lbs/yr) / 8760 (hours/year)
3. Annual Emissions (tons/yr) = Annual Emissions (lbs/yr) / 2000 (lbs/ton)



APPENDIX C

EPA - AP-42 VOLUME II
Table II-7.1 Emission Factors

Heavy-Duty Diesel-Powered Construction Equipment

	Track-type Tractor	Wheeled Tractor	Wheeled Dozer	Scraper	Motor Grader	Wheeled Loader	Track-type Loader	Off-Road Truck	Roller	Misc.
Assumptions										
rated hp	292	192	728	932	179	385	162	929	122	278
25%	25%	25%	25%	25%	25%	25%	25%	25%	25%	25%
load factor	4.4	2.9	11.2	14.8	2.8	5.8	2.4	14.6	2.2	4.6
gal/hr										
Particulate (PM10)										
lb/hr	0.11	0.14	0.17	0.41	0.06	0.17	0.06	0.26	0.05	0.14
g/hp-hr	0.69	1.27	0.41	0.79	0.83	0.81	0.86	0.50	0.76	0.90
lb/k-gal	25.30	46.50	14.80	27.30	22.20	29.30	24.00	17.70	24.20	30.10
Sulfur Oxides (SO₂) (S=0.22%, Default)										
lb/hr	0.14	0.09	0.35	0.46	0.09	0.18	0.08	0.45	0.07	0.14
g/hp-hr	0.85	0.85	0.87	0.90	0.87	0.86	0.85	0.89	1.00	0.93
lb/k-gal	31.10	31.10	31.20	31.20	31.10	31.20	31.20	31.20	31.10	31.10
Sulfur Oxides (SO₂) (S=0.50%)										
lb/hr	0.31	0.20	0.79	1.05	0.20	0.41	0.17	1.03	0.15	0.33
g/hp-hr	1.93	1.93	1.97	2.05	1.99	1.95	1.94	2.02	2.27	2.12
lb/k-gal	70.68	70.68	70.91	70.91	70.68	70.91	70.91	70.91	70.68	70.68
Sulfur Oxides (SO₂) (S=0.05%)										
lb/hr	0.03	0.02	0.08	0.11	0.02	0.04	0.02	0.10	0.02	0.03
g/hp-hr	0.19	0.19	0.20	0.20	0.20	0.19	0.19	0.20	0.23	0.21
lb/k-gal	7.07	7.07	7.09	7.09	7.07	7.09	7.09	7.09	7.07	7.07
Nitrogen Oxides (NO_x)										
lb/hr	1.26	1.27	4.17	3.84	0.71	1.89	0.83	4.17	0.86	1.69
g/hp-hr	7.81	11.91	8.15	7.46	7.14	8.81	9.30	8.15	13.05	11.01
lb/k-gal	284.92	436.67	286.10	258.60	253.84	321.23	339.82	286.10	404.51	368.01
Carbon Monoxide (CO)										
lb/hr	0.35	3.59	1.79	1.26	1.51	0.57	0.20	1.79	0.30	0.69
g/hp-hr	2.15	7.34	2.28	2.45	1.54	2.71	2.26	2.28	6.03	4.60
lb/k-gal	78.50	268.50	123.46	84.60	54.65	98.66	82.85	123.46	188.37	153.51
Hydrocarbons (VOC)										
lb/hr	0.12	0.19	0.19	0.28	0.04	0.25	0.10	0.19	0.07	0.15
g/hp-hr	0.75	1.76	0.37	0.55	0.36	0.87	1.11	0.37	0.97	1.01
lb/k-gal	27.60	64.60	13.16	19.00	12.73	43.16	40.55	13.16	30.09	33.70
Aldehydes (HAP)										
lb/hr	0.03	0.03	0.07	0.14	0.01	0.04	0.01	0.11	0.02	0.03
g/hp-hr	0.17	0.28	0.16	0.28	0.12	0.20	0.10	0.22	0.20	0.20
lb/k-gal	6.22	10.30	5.76	9.69	4.31	7.17	3.66	7.74	6.10	6.78

The best method for calculating emissions is on the basis of "brake specific" emission factors, i.e., g/hp-hr. Emissions are calculated by taking the product of the brake specific emission factor, the usage in hours, the rated power, and the load factor. (453.6 g/lb, typical 7,000 bhp-hr, typical 137,000 bhp-hr-diesel)



APPENDIX D

GOLDEN EAGLE MONITORING PLAN

**Golden Eagle Monitoring Plan
Chicken Creek Mine
September 2002
Revised September 9, 2002**

Overview

All known nests within ½ mile¹ of mining operations will be monitored to determine if they are tended and active. Active nests will be monitored to determine how nesting eagles respond to mining operations, and to instill appropriate mitigation measures if negative responses are observed. Attempts will also be made to locate new nests within ½ mile radius of mining operations.

Protocol

These protocols will remain in effect through the active life of the mine unless modified through consultation with USFWS and UDWR.

Tended/Untended nest status will be determined by:

- Observing (monitoring) known nests for one week during the courtship/nest building stage^{2,3}. Each observation day will be at least 4 hours in duration. If occupancy is not detected during these efforts, two additional observations of one week each will occur during the incubation period. A nest will be considered tended if: (1) recent nest materials (e.g., green branches) are observed, or (2) an adult eagle is perched on the nest or nest cliff during the courtship/nest building period.

All tended nests will be further monitored to determine active/inactive status. An active nest is defined as one that has an incubating adult present during the incubation period.

Observe (monitor) all active nests within ½ mile of operations during the following times:

- All daylight working hours of the first week of new activity initiation (i.e., drilling, blasting, excavating, trucking). This would ensure that specific activity types are monitored for a reasonable period of time to detect a negative response

¹U.S. Fish and Wildlife Service. 1999. Utah field office guidelines for raptor protection from human and land use disturbances. Salt Lake City. 41pp.

² The number and duration of monitoring visits could be less if positive evidence is observed earlier.

³ Nesting stage dates may vary between sites and years depending on various biotic and abiotic factors. However, according to data obtained by the UDWR in their Southwestern Region, most golden eagle nests fall within the range of dates provided below:

- Courtship / Nest Building: February 1 – March 1
- Laying / Incubation: March 1 – April 30 (average laying date is 3/15)
- Nestling: April 15 – July 31 (hatching is concentrated between late April and mid May)
- Fledgling: July 1 – July 31 (August 4th is latest known date)

by golden eagles. Should it be determined through monitoring that nesting eagles are adversely affected (courtship and nesting behavior), UDWR and USFWS will be consulted to finalize an appropriate mitigation plan, including appropriate seasons of operation. This monitoring would occur each year that the mine is active.

- A four hour period during each of the major nesting stages (i.e., incubation, nestling, and fledgling), during mining operations. This would provide information on nest status and productivity. This type of monitoring should occur each year during the active life of the mine.
- Request that the operator only blast between October 1 and January 15.

Trigger points for re-evaluating mining operations and consulting the FWS and UDWR are:

- Adults do not return to nest with eggs or young under two weeks of age for a period of ≥ 4 hours.
- Adults &/or chicks show obvious stress symptoms during the activity, and the reaction could result in loss of eggs, young, or adults. Examples include but are not limited to: (1) sudden movement by incubating adult that could jostle eggs, or (2) movements by young that indicate premature fledging could occur.

Inventories for new nests will be conducted annually within $\frac{1}{4}$ mile radius of mining operations. Searches will concentrate on suitable nest cliffs, and will be primarily ground-based with use binoculars and spotting scopes. Searches will be conducted during the courtship/nest building period, and will only occur during years when mining is occurring.

All monitoring data will be recorded in a time-line format that captures mining activities and eagle behavior, regardless of whether there appears to be a cause and effect relationship. Monitoring will primarily be ground-based, with use binoculars and spotting scopes.

All monitoring will be conducted by a qualified biologist of the Forest Service, UDWR, FWS, or contractor. Contract biologists must be approved by the Forest Service.

/s/ Elaine J. Zieroth